The Veterinary Record.

FOUNDED BY WILLIAM HUNTING, F.R.C.V.S., 1888.

No. 31. AUGUST 2, 1930. VOL. 10.

The International Veterinary Congress.

N.V.M.A. President's Message of Welcome to the Delegates.

As President of the National Veterinary Medical Association of Great Britain and Ireland, it is my pleasant duty to extend a very cordial and hearty welcome to all the delegates to the 11th International Veterinary Congress on the occasion of their visit to this country.

Science knows no boundaries, and the fact that each one of us is engaged in the work of investigating, controlling and treating animal diseases makes brothers of us all, so we extend the hand of fellowship to our co-workers of whatever nationality.

We may perhaps be pardoned for pride in the fact that it was an English Veterinary Surgeon who initiated these congresses 65 years ago, and they have been held with varying intervals since. The last occasion upon which the congress visited London was in 1914. It was held under the shadow of a war cloud which burst on the first day and culminated in the most terrible war in history. This year we meet under the cloud of financial depression and unemployment, but we hope this will be forgotten and that foreign delegates will not be able to notice any lack of hospitality or cordiality on the part of their British hosts on that account, for I can assure them that the Congress Committee have worked heart and soul to make the Congress a great success and worthy of the great country to which we have the honour of inviting you. The President, Sir John M'Fadyean, the revered head of our profession, Professor Buxton and Dr. Bullock, to mention only three, have been indefatigable in their efforts on your behalf, while the Foreign Office, the Lord Mayor of London and many others are offering their hospitality.

The Veterinary Profession have a great and honourable task to fulfil to utilise and preserve the live stock upon which the peoples of the world depend, also to check the ravages of disease and to prevent the spread of communicable diseases from animals to man, which is especially necessary now that most countries are still suffering from the aftermath of war. It is hoped that the interchange of ideas, the diffusion of knowledge and the encouragement which can only be derived from personal intercourse will help forward to a marked degree the solution of many problems which must be for the lasting benefit of mankind.

We trust your stay may be a long and pleasant one and that you will take back to your various countries the happiest recollections of your visit to Britain. On behalf of every member of the National, again " welcome "!

G. P. MALE.

The Originator of International Veterinary Congresses.

Professor JOHN GAMGEE, 1830-1894.

M.R.C.V.S., 1852, a graduate of the Royal Veterinary College, London. Opened a new College in Edinburgh in 1857. In 1865, under the name of the " Albert Veterinary College," it removed to London.

In 1863, Gamgee suggested and organised the first International Veterinary Congress, held in Hanover. He was the initiator of Veterinary State Medicine in this country.

Eleventh International Veterinary Congress,

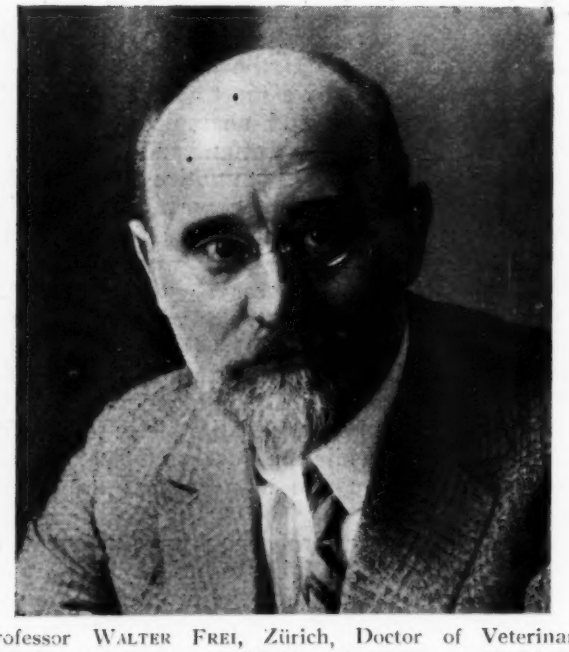
LONDON, 1930.

Some Distinguished Foreign Delegates Attending the Congress.

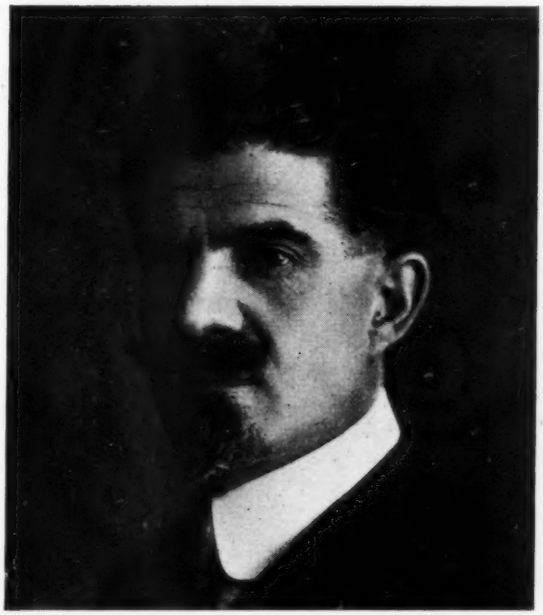
Professor Dr. L. DE BLIECK, Director of the Institute for Parasitic and Infectious Diseases at the University of Utrecht. General Secretary of the Permanent Commission for International Veterinary Congresses. Hon. Member of the National Veterinary Medical Association of Great Britain and Ireland.

Dr. J. JONESCU BRAILA, Director-General, Zootechnic and Veterinary Services, Bucharest.

Professor M. BUERGI, Director of the Swiss Federal Veterinary Office. Professor at the Veterinary-Medical Faculty of the University of Berne. President of the Veterinary Committee of the League of Nations. Vice-President of the International Office for Infectious Diseases, Paris.
Reporter to 1930 Congress on "The Law Governing the Practice of Veterinary Medicine and Surgery."

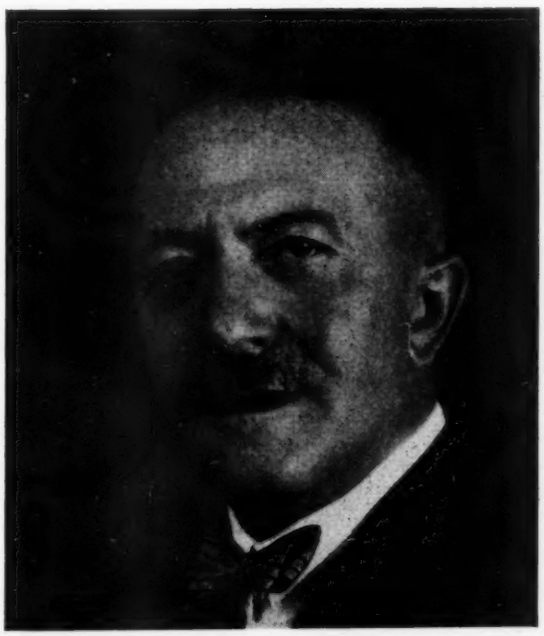


Professor WALTER FREI, Zürich, Doctor of Veterinary Medicine, University of Zürich. Professor of Veterinary Pathology, Bacteriology and Physiology and Director of the Veterinary-Pathological Institute, Faculty of Veterinary-Medicine, Zürich.
Reporter to 1930 Congress on "Bovine Sterility (Prophylaxis and Treatment)."

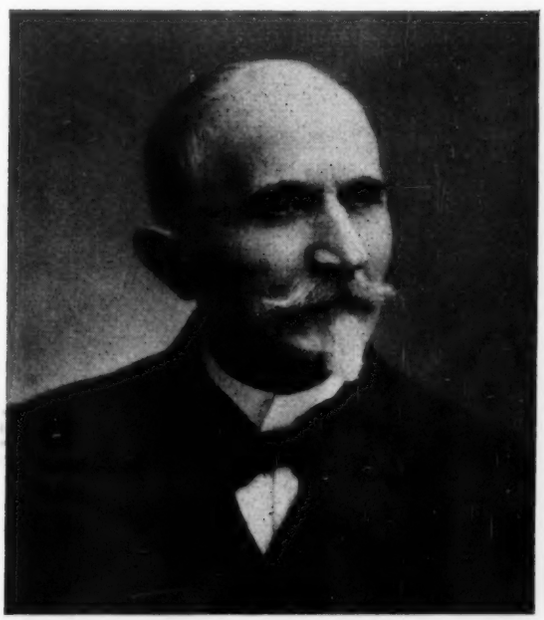


Professor C. Pietro Ghishleni, Director, Veterinary High School, Turin.

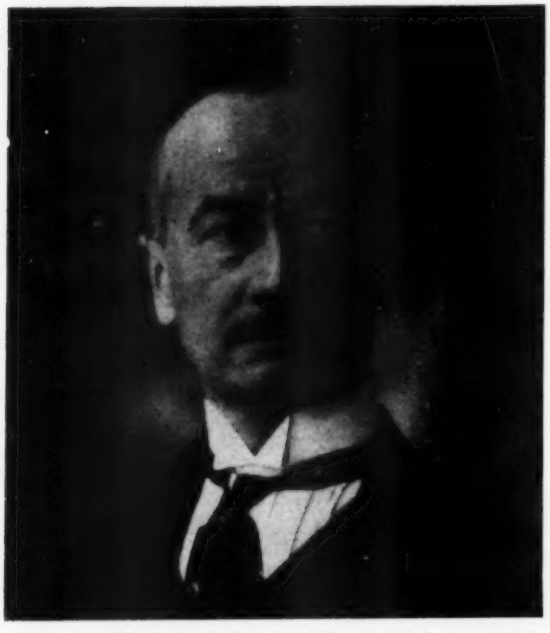
Dr. George Hilton, Veterinary Director-General, Canada. Official Canadian Representative to the Eleventh International Veterinary Congress. Member of Permanent Committee of the International Veterinary Congresses.



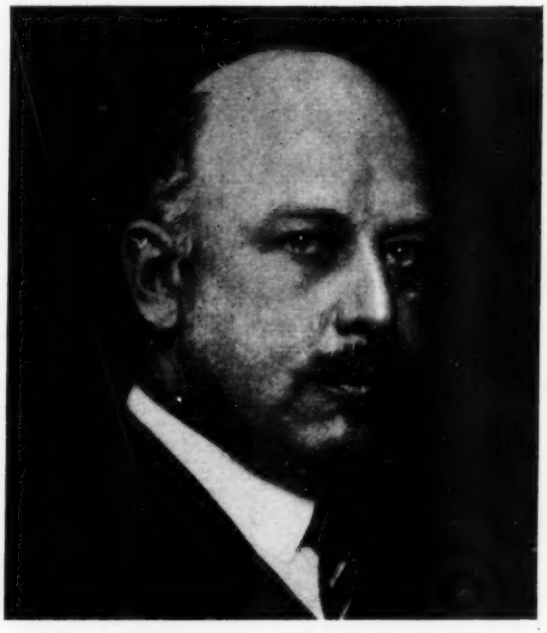
Dr. Karl Kasper, Director, Government Veterinary Department, Vienna.



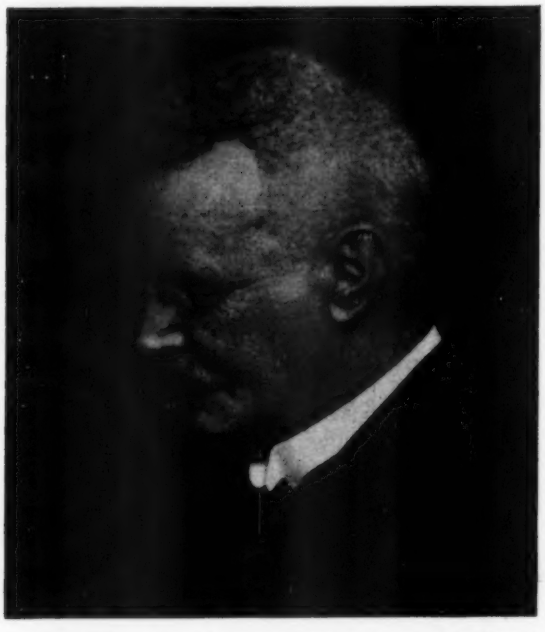
Professor F. X. Lesbre, Honorary Director, Veterinary School of Lyon.



Professor Dr. Joseph Marek, Professor of Special Pathology and Therapeutics, Veterinary High School, Budapesth. Honorary Director, University of Utrecht. Joint Author, "Special Pathology and Therapeutics." Reporter to 1930 Congress on "Deficiency Diseases."

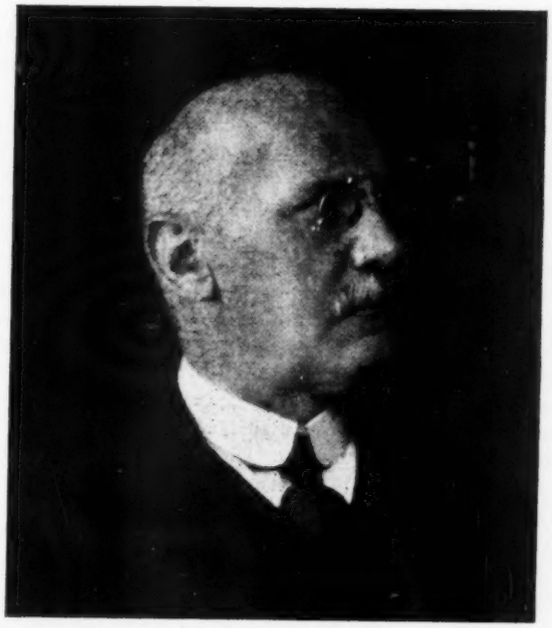


John Robbins Mohler, A.M., V.M.S., D.SC., Chief of the Bureau of Animal Industry, United States Department of Agriculture. Late Editor, *Journal of the American Veterinary Medical Association.* Past-President of both the United States Live Stock Sanitary Association and the American Veterinary Medical Association. Reporter to 1930 Congress on "Standardisation of Biological Products (Sera, Vaccines and Diagnostic Agents)."

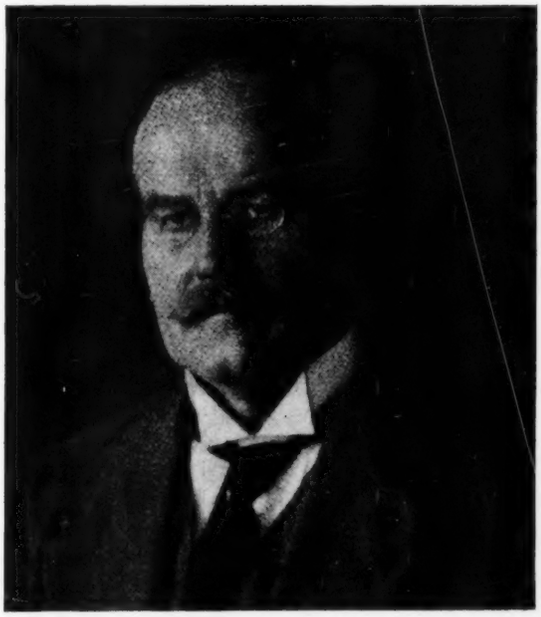


Dr. Adam Wilhelm Mørkeberg, Professor of Veterinary Science and Director, Royal Danish Veterinary and Agricultural High School, Copenhagen.

Professor P. Rubay, Rector, State School of Veterinary Medicine, Brussels.



Professor Dr. A. Zimmermann, Professor of Veterinary Anatomy, University of Budapesth.



Dr. Wilhelm Zwick, Prorector, University of Giessen. Director, Veterinary and Hygiene Institute, Giessen. Reporter to 1930 Congress on "Infectious Abortion of Cattle, Sheep and Swine."

From The Veterinarian,

June, 1830.

We were somewhat puzzled a little while ago by a paragraph in *The Lancet*. The reporter is describing what took place at a meeting of the College of Physicians. Two letters had been read. "The third was from a member of the Veterinary College, descriptive of some coloured drawings of certain morbid appearances in glanders in the horse, the ass, etc."

"A member of the Veterinary College!" "Who can this be?" thought we: "Our old friend, Vines? He has announced a work on glanders, with coloured engravings, and we have for some time been anxiously expecting its publication. No! no! it cannot be him. We know him too well. He, we are convinced, would feel that, when writing on a veterinary subject, common sense, courtesy, and interest, would induce him first to consult his brethren. If he submitted his productions to another tribunal, his good sense would tell him that the natural conclusion would be, either that he did not think us competent, or that he was afraid to meet us. We will enquire about this; we will see if there is anyone who, just at this point of time, when Mr. Vines's work is struggling for birth, is justly asserting a prior claim, or endeavouring to rob him of deserved commendation."

We enquired; and lo and behold! we found that it was Mr. Assistant Sewell, who, again forgetting that there were veterinary surgeons, and societies, and publications, or believing that we were really as ignorant as the faulty education of the College had a tendency to make us, had scorned to submit his lucubrations to our consideration, but had taken them to a more competent tribunal. However, we will not say another word about this; it would be perfectly useless; but we will relate the result of the affair, and we wish Mr. Sewell joy of it.

"Oh! it was Mr. Sewell," said a physician of no mean eminence, who had been present at the meeting; "but what he meant by bringing his cases of glanders before us, we could not tell. We knew nothing about them. He took some pains to explain the drawings; but we could make neither head nor tail of them." *The Medical Gazette* of the succeeding week afforded a complete illustration of this. Describing the plates, the writer says: "The first plate represented hepatisation of the lungs of an ass, produced by inoculation from the suppurating hepatised lungs of a glandered horse, that being *one of the sources* of the disease called glanders. The second represented miliary tubercles resulting from inoculation with the matter of a suppurating tubercle of the lungs of a glandered horse, *another and a more common cause of glanders.*"

The Royal Society announces that it is prepared to receive applications for a Lawrence Research Studentship to be awarded for one year for research in some subject related to the cause and cure of disease in man and animals. The sum available will not be more than £200, but the Council will be prepared to consider an award to the holder of a stipend from some other source; the total emolument will not exceed £350. Applications must be sent in by October 11th, on forms to be obtained from the assistant secretary, Royal Society, Burlington House, London, W.1.

"The eradication of bovine tuberculosis is one of the pressing problems of the day. In the fight against the corresponding disease in the human family very substantial progress is being made. This was brought out very clearly in the discussion on the Scottish estimates in the House of Commons. Major Elliott's speech was redolent of success in the battle. The fight against bovine tuberculosis is one aspect of the struggle. In these circumstances it is to be regretted that the Board of the Highland and Agricultural Society treated the scheme of the N.V.M. Association (Scottish Branch) with such scant respect. Many breeders, especially of dairy cattle, have gone to great expense, and have had conspicuous success, in clearing their herds of the scourge. These men do not regard the scheme proposed by the N.V.M. Association as impracticable."—*Scottish Farmer.*

Retrospect Section.

Veterinary Pathology in Retrospect.

By Professor S. H. Gaiger, F.R.C.V.S., Professor of Veterinary Pathology, University of Liverpool.

The Tenth International Veterinary Congress was held in London in 1914, the Eleventh is being held in 1930, an interval of sixteen years. It is perhaps not correct to say the 1914 Congress was held, because the outbreak of war put an end to the proceedings, but at least the papers which had been prepared were printed, and bound in two large volumes, these forming a valuable record of the state of knowledge on a multitude of veterinary scientific subjects up to that time.

Sixteen years is a long enough period to bring about considerable changes, changes in personnel as well as advancement in knowledge. The loss of such men as Sir Stewart Stockman and Professor Mettam, who took part in the 1914 Congress, will be felt as a personal loss by all British veterinarians especially, and as a loss to veterinary science by all attending the 1930 Congress. It is to some of the changes in veterinary pathological knowledge that I wish to refer in this brief retrospect which I have been asked to write for the Congress number of the *Veterinary Record*.

On reviewing the 1914 and 1930 programmes side by side, one main change is at once apparent. In 1914 there are such headings as "Foot-and-Mouth Disease," "Anthrax," "Tuberculosis," titles which by their magnitude and comprehensiveness make one almost gasp at the tasks set the Reporters. The 1930 programme, in the case of the diseases named, places a limit on the papers by confining them to definite sections of the subjects, as Foot and Mouth Disease (Pleurality of Viruses, Immunisation, Disinfection), Anthrax (Control of Dissemination by Animal Products), Tuberculosis (Vaccination). This change, where used judiciously, is welcome. To discuss the whole of any one of these diseases would require a Congress for that disease alone. Not only in these but in many other important animal epizootics we must come to realise that each disease has many aspects, problems to be worked at from different angles, by division of labour, and by team work at several research institutions. In medical science we find this system at work, for example in cancer research, but in veterinary science we too frequently find a tendency towards the view that such and such a subject belongs to such and such an institution. If research into human pathology utilises so many workers at so many different centres, comparative pathology requires at least as large an organisation to achieve results. Progress will only be rapid when we broaden our outlook and not only make full use of all our existing resources but extend them. Let us hope, then, that this principle of division of subjects, so amply recognised in the 1930 programme, marks the commencement of a new epoch in veterinary scientific research.

A glance at the 1930 programme shows that of the twenty-eight subjects which comprise the whole, there are only six which do not ordinarily fall under the heading given to Section I, Pathology, Bacteriology and Epizootiology, showing the paramount importance of these branches of veterinary science. Notwithstanding the inclusion of a subject like Acute Infectious Mastitis under "Veterinary Medicine," it is to the etiological and immunological aspects that attention will be directed if interest is to be aroused in the proceedings.

Of the subjects in the 1914 programme, the following find no place in the 1930 list:—Johne's disease, Bovine Piroplasmosis, Filterable viruses, Glanders, Sarcoptic Mange. The incidence of glanders in most civilized countries has so greatly decreased in the last few years, thanks to the value of Mallein as a diagnostic agent, that it is not surprising that this subject has been crowded out of this year's programme. Doubtless the omission of Sarcoptic Mange merely means that it has had to give way to more pressing matters. Bovine piroplasmosis was dealt with very fully in 1914, coming under "Piroplasmoses in European Cattle with particular reference to their Etiology." and also under "Diseases transmitted by Ticks; their Classification, Treatment, and Eradication." which perhaps, explains its absence in 1930. The subject "Filterable Viruses" was possible as a single item in 1914, but well-nigh impossible in 1930 on account of its magnitude, so we find it broken up in the latter into many sections in which, without doubt, the general features of the various viruses will be dealt with, although no opportunity has been allowed for a summary of present knowledge regarding that all-important question, the artificial cultivation of filterable viruses. It is not so easy to understand why Johne's disease does not appear in the 1930 programme, for it can hardly be held to have been crowded out by several subjects which are of undoubtedly lesser importance. Causing, as it does, such immense losses, it would have been valuable to have had on record the most recent views regarding diagnostic agents and vaccination, but these apparently must wait for a future Congress.

In the 1914 Congress no mention was made of actinomycosis, but in the sixteen years that have elapsed much valuable investigation has been carried through. What is clinically termed actinomycosis is now known to be etiologically a whole group of diseases caused by such different organisms as *Actinobacillus lignieresi, Streptothrix actinomyces (Israel and Wolff), Staphylococcus pyogenes,* and *Corynebacterium bovis.* This seems to be another important omission from the 1930 programme.

Several new subjects appear for this Congress. Variola in Domestic Animals has a heading to itself, whereas in 1914 it had the barest mention amongst other viruses. Also in 1930 pox of fowls receives separate treatment from the other poxes. The same remarks apply to rinderpest, which appears in the 1930 programme though limited to prophylaxis. Poultry diseases deservedly receives a whole section to itself, whereas sixteen years ago the subject was evidently considered hardly worth mentioning. Diseases of the New-born is a new heading and a curiously indefinite one, though the names of the Reporters suggest that the somewhat vague and wide title will be interpreted as meaning mainly Joint-ill. Other new subjects are Rabies (Vaccination), Blackleg (Vaccination), Standardisation of Biological Products, Milk Fever, Bovine Sterility (Prophylaxis and Treatment) and Acute Infectious Mastitis. No less than eight subjects have special emphasis laid on vaccination or immunisation and some are limited to that single sub-head, which tends to make large parts of the programme purely utilitarian. A welcome extension on

this occasion is the section on Zootechny, which now becomes Zootechny and Dietetics, and in place of a single article upon hereditary defects in horses dealt with by one Reporter, we have in 1930 seven Reports dealing with Genetics (Principles of Breeding), Deficiency Diseases and Scientific Feeding of Animals. It is a matter for deep regret that Animal Genetics and Animal Nutrition did not figure in the programmes of previous Congresses. In Britain, at any rate, the investigation of these subjects, which are essentially veterinary, has, from our neglect of them, passed for a time out of veterinary direction. Let us hope that young men will come forward who can make these their subjects of special study, and bring them back to the profession to which they rightly belong. The result would be beneficial both to the subjects and to the veterinary profession.

It is of great interest to examine to-day the two volumes of articles left to us from the 1914 Congress. To appreciate progress one must occasionally look back over a period of years and compare the present state of knowledge with what is was then. Only a few comparisons can be made here.

No less than 157 pages of print are devoted to foot-and-mouth disease and it is of interest to recall that in those days there was no suggestion that the disease could be conveyed to laboratory animals for study, the first definite results in this direction being in 1920. One had not then experienced the thrill which Frosch and Dahmen's announcement (1924) regarding cultivation of the virus caused, an announcement which unfortunately could not be confirmed by further investigation. The announcement did, however, serve one useful purpose in that it drew attention afresh to the importance to be attached to virus culture and set workers in every nation on to fresh attempts to achieve this desirable end. The 1914 reports mention the very short duration of immunity from natural attacks of the disease, and there was evidently no inkling of the plurality of viruses, announced in 1922. Whilst serum-immunisation was discussed, no reference was made to vaccination with formalinised virus on which so much work has since been done. Almost the whole of our present knowledge, now very considerable, upon the survival of the virus outside the body, has been acquired since the time of the last Congress. In 1914 the foot-and-mouth disease virus was commonly referred to as a fragile virus, but in 1930 we know it is a virus which, under certain circumstances, has remarkable powers of longevity outside the living body. It might be said that in spite of this increase in knowledge our methods of dealing with the disease remain the same, namely, slaughter or the limitation of infection by sanitary police methods. That may be literally true, but there is this to be said in defence of the expenditure of large sums of public money upon research, that the new light which has been and is being thrown upon the virus and its various properties, has been of the greatest value to those whose duty it is to try and keep the disease out of this country. Exact knowledge as to how infection gets into a country like Britain which has natural boundaries may enable us in course of time to keep the disease out altogether.

Tuberculosis in 1914 had 92 pages of reports given to it. The reports dealt with the relationship of the various types of tubercle bacilli, measures necessary to safeguard human beings against the infection, immunity and anti-tuberculosis vaccination. Professor Vallée reviewed the various methods then known of conferring immunity and at the close of his account makes mention of the vaccine of Calmette and Guérin or the " B.C.G. vaccine " as it has now come to be called, but he recognised that it was then too soon to make any estimate of its value. It was in 1909, 1910, and the first half of 1914 that Calmette and Guérin showed how, by cultivating a bovine strain of tubercle bacillus upon glycerinised potato soaked in ox bile, the bacillus gradually lost its virulence for calves, monkeys, and laboratory rodents, and, though not causing any illness in them, conferred on them considerable resistance to test inoculations, thirty days later, with lethal doses of virulent tubercle bacilli. Sufficient was accomplished up to August, 1915, when the war conditions put an end to the experiments at Lille, to show that a most hopeful line of vaccination had been found. It seemed that here at last was a method of immunisation with living tubercule bacilli incapable of setting up infection in the inoculated and harmless to animals or man if discharged from the bodies of the inoculated. Since the termination of the war the work has been followed up with vigour. The original investigators have carried on and extended their work, and observations upon the B.C.G. vaccine have been carried out in many countries in the world upon a considerable scale both in the field and in the laboratory. There are those who are enthusiastic about the value of this method, there are others who are inclined to doubt the immunising value of the vaccine, and still others who express grave doubts as to whether the B.C.G. strain is altogether free from danger. The General Meeting of the 1930 Congress devoted to tuberculosis vaccination will be looked forward to with extraordinary interest and the names of the Reporters ensure that we shall have all points of view.

In 1914 infectious abortion appeared under the title of Epizootic Abortion. It was in 1896 that Bang described the organism we now call Bang's bacillus and it was only one year prior to the last Congress that M'Fadyean and Stockman described what is now called the *Vibrio fetus* as the cause of most cases of abortion in sheep and some cases of abortion in cattle. Since then a vast field of work has been published, and outbreaks due to other organisms have been described, but nothing in connection with abortion in animals has been of greater general interest than Miss Evan's discovery in 1918 of the remarkable resemblance between *Brucella abortus* and *Brucella melitensis*, a resemblance which is so close that amongst laboratory tests only the agglutinin-absorption test serves to distinguish them. In spite of the close serological relationship, we must bear in mind that investigation has shown *Br. melitensis* to be mainly an organism pathogenic for the goat, occasionally causing abortion, and present in large numbers in the milk of the goat, being easily able to set up undulant fever in human beings drinking such milk; and that *Br. abortus* is mainly an organism pathogenic for the cow, frequently causing abortion, and present only in small numbers in the milk of the cow, an average of only 2 per c.c. as Hasley has just shown in America. In these circumstances it is exceptional for *Br. abortus* to exert pathogenic effects in man, though

undoubtedly it can, and sometimes does, do so. The first recorded case of undulant fever caused by *Br. abortus* was reported in 1924, the blood of the patient yielding a culture of Bang's bacillus. Since then instances are on record in several countries. The percentage of cows eliminating Bang's bacillus in the milk has been found to vary from 29 per cent. to 83 per cent.

For 1930 the only restriction imposed upon the General Meeting on infectious abortion is that it is limited to this condition in cattle, sheep and swine. This leaves an enormous field for the Reporters and for discussion, and it is certain that the public health aspect which, as pointed out, was unknown in 1914, will be fully dealt with.

The limitation of the anthrax papers in 1930 to "Control of Dissemination by Animal Products" seems to shut out from consideration the important observations of Besredka, published as long ago as 1921 and strongly supported by the work of Balteano in 1922, upon skin susceptibility in anthrax and its logical sequel skin immunity. The 1914 papers dealt with Measures against anthrax in the United States, Vaccination, Pathogenesis, and Prophylaxis. Under pathogenesis, Professor Szpilman stated, almost prophetically, that many lacunæ still remained in our knowledge relating to pathogenesis.

The Etiology of distemper, and vaccination against the disease are matters which have been prominently before us for several years. It is twenty-five years since Carré demonstrated the presence of a filterable virus in distemper, and in 1926 Laidlaw and Dunkin confirmed this finding. It is appropriate that at the 1930 Congress there should be a summing up of the present state of knowledge regarding Etiology and Vaccination.

Perhaps in no branch of Bacteriology have there been greater advances in knowledge since 1914 than in connection with anærobic infections. Prior to the war some well-known authorities contended that there was no difference between *Clostridium chauvoei* and *Vibrion septique* and that these two organisms were identical. Then came the war with its gas gangrene cases, and an intensive study of anærobes was the result. Improvements in technique were quickly forthcoming and the tangle of knowledge was gradually unravelled. How ludicrous it would now seem for anyone to doubt the numerous points of differentiation between the two organisms above-mentioned. Our knowledge of these organisms goes on increasing from year to year. It is now almost common knowledge amongst veterinarians that clinical blackquarter in cattle is in most cases caused by the *Cl. chauvoei* but in some instances is a *V. septique* infection. The sheep seems peculiarly liable to *V. septique* infections, though cases of *Cl. chauvoei* infection have been recorded. The belief has been expressed, without convincing evidence to support it, that all cases of *V. septique* blackquarter have got *Cl. chauvoei* present in the muscles in addition, but that the latter is masked in cultural investigation by the stronger-growing *V. septique*. Clinical blackquarter is now known to be also caused by the *Cl. œdematiens* alone, and in conjunction with other anærobic organisms. *Cl. welchii* also helps to cause clinical blackquarter in conjunction with *V. septique*. More recently, we have had recorded a new anærobe pathogenic for animals, the *Cl. paludis*, M'Ewan, differing from *Cl. welchii* in the specificity of its toxins, and found in connection with the disease known in Kent as "Struck." In recent years we have had very much to the fore deaths from botulism in animals, a condition of Empire-wide significance. Lamb dysentery is another anærobic infection of tremendous importance in this country and has been recorded in other countries as well. Of such importance was it considered in Britain that a special sub-committee of the Agricultural Research Council carried out experiments for some years upon it. Moreover, an effective prophylactic serum has been evolved for use upon new-born lambs.

It was noticeable after the war that the significance of anærobic infections in man had disappeared and the enormous output of research work by human pathologists on these organisms came almost to an abrupt ending. Quite the reverse was the case in animal diseases, where the war-time experience served to show an immense new field and investigations by veterinary pathologists have been continued ever since into anærobic infections in animals. It is worthy of note that such veterinary investigations were just as much needed prior to the war years and would have been carried out had facilities and funds been available. The knowledge to have been gained in veterinary science would have been of great value in medical science and would have greatly helped the war-time investigations of the soil anærobes in war wounds. As it was, an immense new field had to be investigated during the war period and prophylactic anti-sera only became available for use against human gas gangrene cases about the time of the Armistice.

The only place in the 1930 programme given to this vast new field of investigation is in Section I (f) Blackleg (Vaccination), which barely touches the fringe of the subject.

The volume of investigation carried out into the treatment of distomatosis during recent years receives recognition in the 1930 Congress by the addition of the words "and Trematode" to the 1914 heading "Treatment of Diseases caused by Nematode Worms." A large amount of work upon the drug treatment of nematode diseases has been done since the reviews in 1914 by Professors Craig and Railliet. Professor Railliet in 1914, speaking of nematodes in the stomach and small intestine of ruminants, said that drugs *often pass into the first stomachs and fail to exert any effect*. Has the position altered in the last sixteen years with regard to the deadly Ostertagia and Nematodirus genera? It would indeed be a noteworthy announcement for the 1930 Congress if we could be told of some simple and effective drug treatment for these pests of agriculture.

As in 1914 so in 1930 there is a Section of the Congress devoted to Tropical Diseases. Some countries in South Eastern Europe and elsewhere would be only too glad if rinderpest could be relegated to the tropics, as has been done for the purposes of the 1930 Congress. This disease has not been seen in Britain since 1877, though in 1920 there was an outbreak in Belgium where, within a month of diagnosis, 58 communes and 130 farms became affected, with a loss of 1,068 cattle dead or slaughtered. The main lesson from the Belgian outbreak was "that rinderpest is not nearly as formidable as at one time thought to be" and that the disease is not difficult to stamp out in a country with a properly organised state veterinary service. The cargo of Indian cattle which

brought rinderpest to Antwerp in 1920, carried the cargo and disease on to Brazil, where the disease was also successfully dealt with, and the American Continents are again known to be free. The Government of India would give a good deal to be able to stamp out rinderpest from that country, but while veterinary science has pointed out the way religious prejudice against the slaughter of bovines effectively prevents anything radical being attempted.

The 1930 Congress is to deal only with the prophylaxis of rinderpest. In past years as many as 20 per cent. of losses in inoculated cattle have occurred as a direct result of the serum-simultaneous method of inoculation, and undoubtedly much of this loss was due to the use of too weak a serum. After years of experience, opinion in most rinderpest countries is favourable to the serum-simultaneous method and losses from inoculation have been reduced to 0·5 per cent. The immunity conferred lasts at least a year and may be longer. In Egypt, where susceptibility to rinderpest decreases with the age of the animals, it is claimed that immunity lasts five or six years. It would be interesting to be told why Egypt should differ from other countries in this respect.

Section III. (a) in 1930 deals with Theileriasis, and the views of the Leningrad and San Francisco Reporters will be awaited with interest. The condition of chief interest under this heading is East Coast fever, which is an African disease, and was briefly dealt with by Sir Arnold Theiler at the 1914 Congress under "Diseases transmitted by Ticks." A point of special interest is centred in this disease in that the schizonts of the *Theileria parva* are usually confined to lymphatic glands, spleen, liver, kidney, bone-marrow and intestinal mucosa, though in very severe cases they have been found in the peripheral blood. Probably owing to the small number of animals experimented upon, it has until recently been considered that East Coast fever could not be transmitted to healthy bovines except upon the rare occasions when schizonts were present in the peripheral blood stream, but the recent work of Sergent and others in North Africa in 1927 showed that they were able to transmit the disease by various routes by blood inoculation in 25 per cent. of instances. This work was repeated in South Africa by Theiler and Du Toit, who in 1929 reported that they had obtained positive results in 24 per cent. of instances. Does this mean that schizonts are more commonly present in the peripheral blood than was hitherto supposed to be the case?

Sixteen years ago one might have hunted carefully in the Congress Reports for any treatise on poultry diseases, without result. In 1930 "Poultry Diseases" occupies a whole Section of the programme. The Reporters on Fowl-pox, Fowl Typhoid, and Bacillary White Diarrhœa are given a free hand with their subjects, but Fowl Plague is limited to vaccination. Fowl Typhoid and Bacillary White Diarrhœa are joined in one headline in the programme. Are we about to be told that these two organisms, which so remarkably closely resemble one another, and which some investigators declare cannot be distinguished, are really one and the same organism? This should be one of the most interesting Sections of 1930 if it is not spoiled by being too comprehensive.

Finally, a word on acute infectious mastitis. Presumably this will be mainly bacteriological and prophylactic. One would have liked to see a Reporter from the Rockefeller Institute where so much work has been done, but perhaps their observations will be summarised. From all the mastitis investigations of the past sixteen years there must be much to record and review in 1930. The name conjures up visions of streptococci, a life's study in themselves, staphylococci, *Esch. coli*, Corynebacteria, etc., etc., and one looks to the 1930 Congress for observations which will enable us to assess the various causal agents at their true value. It has been claimed in America that "the newly developed Thybromol test permits the detection of most streptococcus carriers even in pre-clinical stages." Has this been borne out in this country?

A consideration of the past sixteen years of veterinary research and a study of the 1930 Congress programme with its veritable feast of subjects can hardly fail to leave veterinarians with mingled feelings. As has been pointed out, the bulk of this year's programme is Pathology, Bacteriology or Protozoology. What has happened to Veterinary Surgery and Obstetrics that they should merely appear as parts of the title of a Section, without any papers being presented on either? Have no advances been made in Veterinary Physiology since the 1914 Congress which would merit a Section for 1930? Have we in all the world no veterinary biochemist whose work merits a paper in this Congress? The answers to the last two questions would seem to be in the negative and if this is so there is something wrong. Agriculture is crying out for increased knowledge in veterinary physiology and biochemistry, and if the veterinary profession does not meet this need some other profession will, as in the case of animal genetics and animal nutrition. Our remedy is to get such changes made in our curricula, notably an increase in practical laboratory instruction, that our young students will be able to get inside these less explored fields instead of merely hearing about them from outside.

Swine Erysipelas.

"Swine erysipelas is a disease that is more prevalent amongst fat pigs than amongst store animals, and it has a way of attacking fat pigs just on the point of marketing. The prevalence of the disease must not, however, be exaggerated. It mostly occurs in the Eastern Counties, but rarely in an epidemic form. Ordinarily, it shows itself in odd sporadic outbreaks, which seem to come directly from the soil organism which causes the disease rather than from contact with other pigs.

"On the Continent, where the disease is much more severe and is usually epidemic, the common method of dealing with it is by way of inoculation. There are two methods: First, inoculation with a preventive serum got from horses whose blood has been highly immunised from this swine disease, and, second, by vaccination of this preventive serum and of pure cultures of the bacillus. The first method ensures immunity for ten days or so and the second for perhaps as long as six months. In a district in Germany, where many thousands of pigs were vaccinated by the combined method of serum and culture, the disease has disappeared entirely.

"It is not a scheduled disease under the Diseases of Animals Acts, and there is no obligation to report outbreaks to the Ministry for administrative action. A pig-keeper ought, however, to seek advice from his veterinary surgeon, bearing in mind that the serum inoculation is appropriate in cases where disease has already broken out, and that the vaccination is a preventive for use where animals have not taken the disease. This is most important, as it is very risky and unwise to vaccinate where the disease is already present. Leaflet No. 227, issued by the Ministry, contains fuller and more detailed information on the subject."—*Ministry of Agriculture*.

A Retrospect of Human and Veterinary Surgery.

By J. J. O'Connor, M.R.C.V.S., Professor of Surgery, Veterinary College of Ireland.

Surgery, strictly speaking, means the performance of operations on the living body by the hands alone or, more frequently, by the aid of instruments, but the term has come to include the application of the knowledge of medicine to affections outside the body cavities (*Externe Medicine*) and for this reason has been spoken of as external medicine.

In giving a retrospect of Veterinary Surgery, the history of Human surgery must be considered, as one is intimately linked with the other. Progress in Veterinary Surgery has been largely dependant on that in Human Surgery.

Simple surgical operations, such as suturing wounds, the application of immobilising dressings for fractures, and the opening of abscesses, have been performed from time immemorial by the most premature races. Even more elaborate surgical procedure was practised in early times. Operation for cataract was known to the early Babylonians of 2000 B.C., as were also circumcision, castration and the removal of tumours by the knife and thermo-cautery; and instruments, including knives, probes, forceps, saws, and trephines have been found both in Ninevah and in Egyptian tombs. The Indians were also versed in Surgery as well as in medicine, and at the time of Susruta the art was practised with considerable skill. They possessed more than 100 varieties of instruments composed of fine steel, and cleanliness and neatness were demanded of the operator who made himself proficient in the use of the knife by practising incision on fruits and plant stems. The Indians operated for anal fistula, stone in the bladder, and even performed abdominal section, while they were skilled in the operation for cataract. The other Eastern nations had not developed the art to the same extent. From several centuries B.C. Greek surgeons were employed at the Persian Court. The Chinese operated in a crude fashion and largely practised acu-puncture by gold and silver needles for the cure of headaches and neuralgia. They also made extensive use of the moda, or burning cone, to produce counter-irritation. They had considerable knowledge of anæsthetics and more than 1,500 years ago made use of preparations of hemp to annul pain. The Greeks and Romans used mandragora, a solanaceous plant allied to Belladonna, for a similar purpose.

Hippocrates (460-370 B.C.) was a renowned surgeon, and the treatises in his work *Corpus Hippocraticum* show great skill, especially in treating wounds and affections of bones and joints

Trephining, pleurotomy, paracentesis abdominis, amputations and numerous small operations, as for hæmorrhoids and fistulæ, and skilful manipulations for fractures and dislocations were undertaken by contemporary surgeons.

Their surgical equipment comprised sponges, probes, cupping vessels, cauteries, steel knives, dissectors, retractors, speculæ, trephines, bladders with tubes for injections, catheters, specula, forceps and the *Scemnun Hippocrates*—a bench furnished with pegs and pulleys to aid in manipulative surgery. Hippocrates describes healing by first and second intention.

The complications of wounds were described in his treatise on " Wounds of the Head " and head injuries were exhaustively and skilfully dealt with, the operation of trephining being advised when the brain was involved. Simple and compound fractures were treated by appropriate measures. Lithotomy was referred to, but there was little mention of hernia in his writings.

Famous representatives of the Alexandrian School of Medicine were the celebrated anatomists, Herophilus and Erasistratus and the skilled surgeons, Philoxemes and Ammonius, the latter being a specialist in lithotomy.

Julius Caesar caused an influx of medical experts into Rome from Egypt and Greece by conferring civic rights upon them, and one of these, Asklepiades, introduced the operation of tracheotomy. Prior to that, Roman surgery was of a primitive nature. Cato, for example, in his *De Re Rustica,* mentioned only simple rules and charms for the treatment of fractures, ulcers, etc.

Archaguthus (218 B.C.) received the name first of " Vulnerarius " from his kill in treating wounds, and afterwards that of " Carnifex " or " Butcher," on account of the frequency with which he used the knife.

In the first century A.D., Celsus, in his writings, gives a lucid account of surgical procedures practised at that epoch. For wounds he recommends various applications containing antiseptic and astringent properties, while he advises bleeding for inflammation, and ligation for hæmorrhage, and gives minute details for trephining, amputations, the radical cure for hernia, urethrotomy and suturing wounds of the large intestine.

Heliodorus, a contemporary of Celsus, performed similar operations, and Antyllus, who also practised at the same time, removed cataract by extraction and suction and treated aneurism by double ligation and evacuation of the intervening sac.

Over 200 different forms of instruments were found in the surgeon's house at Pompeii. Leonides, also, lived about this time and was a skilled operator who made use of the ecraseur, dissected out enlarged cervical glands and amputated by the flap method.

In the seventh century Paulus, of Ægina, in his celebrated sixth book, describes lithotomy, trephining, tonsillotomy and amputation of the breast, but in describing the radical cure for scrotal hernia commits the error of advising removal of the testicle, which was perpetuated by the Arab surgeons. He also deals well with ophthalmic surgery, removal of foreign bodies and operations on the genital organs.

Military medical services were well organised in those early days and, in addition to the ordinary medical officers with cohorts and legion, there were, as described in the Emperor Marcus's book " On Tactics " (about A.D. 590), ambulance companies for bringing the wounded to the rear, and who were provided with water flasks.

The foundations of military hospitals in permanent camps have been discovered, showing that these were spacious, handsome buildings, and to them noscomi, or male nurses, were attached.

The Arabs from the 7th to the 13th Century displayed little originality in the practice of surgery, adopting only the methods of Paulus of Ægina. Abulcasim of Cordova, who lived in the 11th Century, was their most celebrated surgeon, and wrote a work on surgery characterised by

numerous illustrations of instruments, including cauteries of all shapes which he used for incisions and arrest of hæmorrhage in various operations.

Until the establishment of Universities in the 12th century, western surgery was practised chiefly by ecclesiastics, and notwithstanding the edict of the Council of Tours (1163) against the practice, Guy de Chauliac and Bishop Theodoric were the most distinguished surgeons of their age.

The vagaries of strolling and ignorant mountebanks who practised surgery during its state of disorganization were probably responsible for this and other similar edicts. As a consequence of the serious injuries often inflicted by these charlatans, the medæval surgeon went in constant danger of his life from the vengeance of patients or their friends.

The celebrated surgeons Hugh of Lucca and Roland of Parnia as late as 1250 refused to operate on the injured lung of a Balangese nobleman till thirty of his friends had given them an oath that no harm would befall them in the event of failure.

Minor surgery passed gradually into the hands of the barbers, and in London a "Barbers' Company" was organized by the 13th century. Similar Corporations were formed about this same time in Paris and other cities.

It was from these bodies that the great bulk of army surgeons was drawn in time of war.

Their members had a considerable amount of special training, as in the lectures on anatomy to barbers in Edinburgh in 1505 and in those of a similar nature at the Collège de St. Côme in Paris and in those of Baniste to the barber surgeons of London in 1581.

Apart from the barbers, there were some celebrated surgeons in the Middle Ages; for example, Roger of Palermo, whose work on practical surgery appeared in 1180, and his pupil Roland of Palermo, William Salicit, who recommends suturing divided nerves, Lanfranc of Paris, who may be said to be the founder of French surgery; Henry de Mondeville (1260-1326) an exponent of asceptic surgery; Jehan Yperman (1295-1357), the great Dutch surgeon, and Heinrich Van Pfalspundt who, in his Wound Surgery of 1460, gives the first account of gunshot wounds. The greatest authority on surgery, however, in mediæval times was Guy de Chauliac (1300-70) whose master work *Chirurgia Magna* (1363) represents the standard of surgical art until the times of Ambroise Pavé. He was extensively quoted by John of Vigo in his *Practica Coprosa* of 1514, in which he originates the theory that all gunshot wounds are poisoned and necessitated the application of boiling oil, thereby inflicting unnecessary cruelty on many patients.

The Renaissance affected surgery through the revival of anatomy, strikingly represented by the profusely illustrated "Structure of the Human Body" published by Vesalium of Padua in 1543. This facilitated the skilful practice of surgery.

Ambraise Pavé, one of the representatives of the Renaissance surgery, lived from 1510-90. He began life as a barber and advanced himself by assiduous work during the French wars to such a degree that he was appointed surgeon to several of the Kings of France and became famous by establishing a mild treatment of gun-shot wounds and for reintroducing the ligature. Celebrated contempories of his were Pierre Franco (1505-70), who gave the earliest known account of the relief of strangulated inguinal hernia; Gasper Tagliacozzi (1546-99), who introduced plastic surgery of the face, especially the repair of the nose; and Fábricius Hildanus (1560-1624) the father of German surgery, who produced an original work entitled "Six Hundred Surgical Cures and Observations."

In 1653 Scultetus published his *Armamentarium Chirurgicum*, the illustrations of which give a good idea of the operative procedure of his time.

In England, Richard Wiseman, who served on the Royalist side in the Civil War, caused a great advance in clinical surgery by the issue of his "Severall Chirurgical Treatises" (1672), and he was the first to recognise the identity of tuberculosis in bones and joints with this disease in the lungs. In the 18th century rapid strides were made in the advancement of surgery, due chiefly to the zeal shown in developing the study of anatomy.

The brothers William Hunter (1718-83) and John Hunter (1728-93) were the most famous representatives of this advanced school of anatomy. They also founded great pathological museums which were of inestimable benefit for teaching purposes.

W. Chiselden (1688-1752) was the first to perform the lateral operation of lithotomy, and Percival Pott (1714-88) wrote masterly monographs on hernia, fractures and spinal deformity, and both were well known surgeons and teachers in London. Petit (1674-1750), a celebrated French surgeon, invented the screw tourniquet and was the first to open the mastoid process. Other famous surgeons in France were Anel, who treated aneurism by single ligation (1710); Brasdor (1721-97), Desault and Chopart.

In Italy, Scarpa (1747-1832) was eminent for his researches in anatomy and his skill in orthopædic surgery.

Notwithstanding the great work done by the surgeons of those days, the social status of the average surgeon on the Continent was not high, as was exemplified by the fact that one of the duties of the Prussian and Austrian surgeons was to shave the officers.

The education and status, however, of medical men were raised to a high standard after the founding of the Collegium Medico Chivurgicum and Charité Hospital in Berlin (1727), of the Josephinum or Medico-Chirurgical Academy at Vienna (1785) and of the Collegium Medicum at St. Petersburg (1763).

In the beginning of the 19th century there were many distinguished surgeons in connection with the Napoleonic Wars, including Larrey (1766-1842) whose "Memoirs of Military Medicine" were of great interest. He was the inventor of the celebrated flying ambulances. Other well-known names of this period are Dupuytrin, perpetuated by his "Injuries and Diseases of Bones," Lesfranc, Delpich, Velpian, Malgaigne and Nélaton, all of which are familiar to medical students of the present day. The most renowned English military surgeon of these wars was G. J. Guthrie (1785-1856), who, after the battle of Waterloo, published his treatise on "Gun-shot Wounds of the Extremities requiring Amputation," which was the means of preventing many unnecessary amputations.

Sir Astley Cooper (1768-1841) attained great fame as a surgeon in England. He was constantly improving his technique by dissecting, and wrote valuable works on hernia, affections of joints and diseases of the testis.

Sir B. C. Brodie was for many years the leading surgeon in London and his " Pathology and Surgery of the Joints " was a classic production. It was he who introduced subcutaneous surgery.

A. Collis, of Dublin, was a professor of surgery in that city and became celebrated for his treatise on fracture of the forearm known since as Collis's fracture. John Bell and Sir Charles Bell (1774-1842) were famous Edinburgh surgeons, as were also Liston, who was the pioneer of many new procedures, and James Syme (1799-1870) who was the first to perform excision of diseased joints in preference to amputation. Sir W. Fergusson (1808-77) and Lizars (1783-1860), who was one of the first to remove the lower jaw and to perform the operation of ovariotomy. Largenbeck, in Germany (1776-1851), was noted for the extraordinary speed with which he operated. In Russia Perogoff (1810-81) was the leading surgeon. In America, Valentine Matt (1785-1865) did much to advance the surgery of blood-vessels, Ephraim McDowell (1771-1830) became famous by his operations for ovariotomy, and Marian Senis (1813-83) was skilled in gynæcological surgery.

The introduction of anæsthetics was an epoch-making event in the domain of Surgery, enhancing its value many fold by permitting longer and more elaborate operations than were heretofore impossible.

In 1800 Sir Humphry Davy had experimented with nitrous oxide gas. In 1846 the first surgical operation was performed under ether. In 1847 Simpson introduced ether and afterwards chloroform into the practice of obstetrics. Great credit must be given to Magendi, Claude Bernard, and other physiologists for the information which they afforded, from their experiments on animals, on the functions and reparative powers of the body, which enabled surgeons to put into practice methods which they otherwise would be afraid to adopt.

In 1847 Semmelweiss made the important discovery of the nature of blood poisoning and of puerperal fever which was taken up and studied further by Lister from 1865 onwards.

Pasteur's discoveries on the effects of micro-organisms and of the methods of conferring immunity against them revolutionised surgical procedures.

Lister was the first to make use of antiseptics to prevent their deleterious action through open wounds.

He made his first successful experiments with carbolic acid at Glasgow in 1865, published these in 1867, and carried them out more fully in Edinburgh and London.

The transition from antisepsis to asepsis was the natural outcome of his doctrine and the method he had adopted—the greatest triumph of modern surgery, as it has been rightly termed. He was said to have saved more lives than the 19th century wars had cut off. He was the first surgeon to be made baron (1877).

Since the observance of antisepsis and asepsis abdominal surgery has made marvellous progress. As late as 1855 Sir George Ballingall said that " no man in his senses would think of enlarging the external wound for the purpose of searching out and sewing up the wounded part of the gut, whereas in 1881 Billrath, the pioneer of visceral surgery, operated successfully for cancer of the stomach and during his career performed enterectomy on several occasions, with good results in many instances.

Other notable exponents of abdominal surgery during the latter part of the 19th century were Cyerny, Valkmann, Esmarch, Bergeman, Graefe, in Germany; Paget, Hutchinson, McEwen, Horseley, Spencer Wells, Lawson Tait, in Britain; Kocher in Switzerland; and Bigelow Murphy and Senn in America.

The development of vivisection and pathological research towards the end of the 19th century lead to great improvement in the surgical art and increased the confidence of operators.

The discovery of the Röntgen rays in 1893 gave another great stimulus to surgery of the abdominal cavity by facilitating enormously the diagnosis of affections of the internal organs. The surgery of the brain and spinal cord has made great progress in recent years, due in great part also to the use of X-rays in locating the seats and nature of conditions affecting these organs.

These rays have also proved a boon in diagnosing affections of the kidneys and bladder and thus in selecting the cases for which operation is likely to give relief.

The invention of the cystoscope, enabling the interior of the bladder to be seen, has in a great degree lead to increased precision in operations on this viscus. The skill of oculists has greatly increased in recent times, characterised by more successful and more delicate operations on the eye.

The successful operations of osteotomy and of grafting of bone and of other tissues performed at the present day, are further evidence of the increased efficiency of latter-day surgical methods.

Veterinary surgery has progressed hand in hand with human surgery, but its practice by qualified veterinary surgeons is of comparatively recent date. Many ancient writers referred to the diseases of animals and gave recipes for their treatment. Both Hamer and Xenophan wrote about the management of horses. Virgil's " Georgics " provide evidence of the interest taken in domestic animals and of observations made regarding them in health and disease.

The Latin term *Veterinarius* dates back to the first century. Hippocrates wrote a work on the veterinary art, but its real founder was Vegetius, who wrote *De Arte Veterinaria*, 300 A.D. He quotes Columella and other authorities who existed prior to his time. Little is known of other veterinary writers for centuries after Vegetius, except a few extracts of their works collected by order of Constantine. When iron horseshoes were introduced the maker of the shoes was entrusted with the care of the horse and was known as a farrier, or worker in iron, a term which was frequently applied to the earlier members of the Royal College of Veterinary Surgeons.

In the 16th century, Francis I, recognising the necessity of a higher cultivation of the veterinary art, ordered Constantine's collection to be translated from the Greek into Latin, whence it was translated into Italian, French and German and became distributed over Europe. About the same time the works of Vegetius appeared in several languages and from this onwards the art made gradual progress.

Gessner compiled from Aristotle, Pliney, Columella, Vegetius and others. At a later period there appeared " The Natural History of the Ruminant and the Phenomena of Rumination," by Emiliano. During the 17th century

numerous treatises were written on the veterinary art, the most notable being Caesar Fiarchi's work on "Horsemanship," in which is introduced the most rational method of horse-shoeing then practised—he condemned the use of calkins. Carlo Ruini (Bologna, 1598) published the "Infirmita del Cavallo e Suoi Remedii," from which Spépe and Gibsan in England and most of the French authors have copied their anatomical plates. In 1654 the "Grand Marechal Français," said to have been composed by several authors, appeared and towards the end of the century Solleysel published an elaborate work. He condemned burning the palate for lampas and bleeding it for fevers.

The first attempt, however, to regulate the practice of Veterinary Surgery and Medicine, occurred in 1761, when France established the first Veterinary College under royal patronage at Lyons, the first professor being the oft-quoted Bourgelat, who wrote numerous anatomical and medical works on Veterinary Science.

In 1766 a second school was established at Alfort, near Paris, to which Bourgelat was transferred.

La Fosse, an indefatigable worker in the cause of veterinary science, was comtempory with Bourgelat. His many improvements and discoveries were usually communicated in the form of memoirs to the Academy of Science in Paris. In 1754 they were published in one volume, which was soon translated into other languages.

His son was equally famous, publishing in 1766 his "Guide de Maréchal," and in 1772 his greatest work, the Cour d'Hippiatrique, containing sixty-five anatomical plates coloured after nature, with concise description in letter press. He subsequently published the dictionary d'Hippiatrique in four volumes. After the death of these three illustrious veterinarians, little progress was made until after the Revolution, when Hartman, Chabert, Huzand and others came to the fore. In Britain Thomas Blundeville was a noted veterinary author about the middle of the 16th century and was followed by Mascal, Martin, Clifford and Burdon.

It was in the reign of Charles II that Snape's anatomical Treatise on the horse appeared; and in that of George I, Sir William Hope translated Solleysel's work. Various other veterinary writers lived in the middle of the 18th century, but their productions were devoted mostly to medicine and the prescription of remedies and nostrums which had no scientific foundation.

There was not much evidence in this period of progress in the study of veterinary anatomy and surgery. It was not until the establishment of the Veterinary College in London, in 1791, by the Odiham Agricultural Society that veterinary education was put on a firm footing in Britain. St. Bel, a Frenchman who had studied under Bourgelat, was its first professor. He died in 1793 and was succeeded by Coleman, an enthusiastic young surgeon and a friend of Sir Astley Cooper, Abernethy, Clive Balington, and others who have attained great eminence in the field of surgery.

Most of these took a great interest in the Veterinary College.

Coleman's lectures were highly valued and even at the present day prove very instructive reading. They contain sound and sensible advice on veterinary matters which appears in advance of his time, recommending open air in the treatment of pneumonia and advocating improved ventilation in stables.

Blain, Percival and Youatt were well-known veterinarians of this period and wrote profusely on the diseases of animals and their remedies, but operative surgery did not make great progress in this generation.

Later veterinarians took advantage of the practice of antisepsis and asepsis and the use of local and general anæsthetics followed, as closely as the different circumstances would permit, in the footsteps of the exponents of human surgery.

The results of vivisection on the dog and other small animals serve as a key to the operations that could be successfully undertaken on veterinary patients. Abdominal operations, especially on the smaller animals, are daily performed by present-day Veterinary Surgeons. Credit is due to Hobday for popularising the use of anæsthesia and the practice of major operations on large and small animals and insisting on the necessity of observing strictly all the rules of surgical technique. The X-rays are now frequently made use of for diagnostic purposes in veterinary surgery, the ultra-violet rays are employed for the treatment of various conditions in animals, while the cinema is being utilised to demonstrate abnormalities of locomotion and other abnormal movements in veterinary patients.

From now onwards marked progress will doubtless be observed in the practice of veterinary surgery.

Local and general anæsthesia will be universally adopted, even for minor operations and strict operative technique will be generally observed, putting the veterinary surgeon on a par with the up-to-date exponent of human surgery.

Experimental Tests with an Antituberculosis Serum.

W. A. Kuteischikow (*Zeit. f. Immunitätsforch.*, May 2nd, 1930, p. 261) prepared an antituberculosis serum by the injection of a horse with increasing doses of a living but comparatively avirulent culture of the human type of tubercle bacillus. The strain had been submitted to thirteen successive subcultures on a medium containing a low concentration (probably about 1 in 8,000) of trypaflavine. At the end of this treatment one-fifth of a potato culture gave rise in guinea-pigs, inoculated subcutaneously, to a chronic non-fatal infection confined almost exclusively to the lymph glands and accompanied by sclerosis. The horse was injected over a period of eight months, and was then bled. A preliminary experiment made on a small number of guinea-pigs suggested that the serum had curative properties. A larger experiment was therefore devised on the following lines. Batches S1, S2, and N, each containing twenty guinea-pigs, were inoculated subcutaneously in the thigh with 1 mg. of virulent tubercle bacilli. Ten days later serum injections were commenced; S1 was treated daily for eight months, and S2 for five months, with the specific serum; N was treated for six to eight months, with normal horse serum. Batch S3 of twenty guinea-pigs was infected with 20 mg. and received specific serum treatment. Batch K of ten animals was infected with 1 mg. and received no serum treatment. The results were very suggestive. The animals in the control batch K and the heavily infected batch S3 died of general tuberculosis in four months. During the first four months the animals in batches S1, S2, and N increased in weight; batch N then showed symptoms of illness, and by the end of the eighth month only one animal survived, for 15 had died of general tuberculosis, three had been killed for examination, and one had died from other causes. Of the specifically treated batches S1 and S2, not a single animal had died of tuberculosis at the end of eight months; four animals in S1 died of other causes, and two were killed; in S2 four were killed. The experiment is being continued, but the author considers that the results are so far sufficiently striking to ascribe an undoubtedly curative effect to the specific serum.—*British Medical Journal.*

Parasitology—A Retrospect.

By Thomas W. M. Cameron, M.A., Ph.D., D.Sc., M.R.C.V.S., Lecturer in Helminthology in the University of Edinburgh and at the Royal (Dick) Veterinary College, Edinburgh.

Introduction.

Parasitology is at once the oldest and the youngest of the sciences concerned with the causes and origins of disease in man and his animals. It is the oldest because many of the metazoan parasites are large animals easily visible to the naked eye and so easily discovered; it is the youngest because it is only in recent years that it has been the subject of extensive study. The discovery of bacteria by Pasteur swung the scientific pendulum from the large to the infinitely minute and for a century, microscopic and ultra-microscopic organisms displaced macroscopic animals in popular scientific favour. In recent years, however, tropical expansion has introduced domestic animals into regions where nature has created the optimum conditions for the propagation of parasites and their arthropod vectors; simultaneously, in temperate lands agricultural science has permitted the concentration of stock in densely populated areas, permanently occupied, and has thus changed innocuous parasitic infections into dangerous parasitic diseases.

In the tropics, colonisation has permitted the slightly pathogenic protozoa of native game to attack new non-immune breeds of domestic stock and given the arthropods increased opportunities to flourish. Concentration of stock in enclosed areas and insanitary pens, has permitted the helminths to multiply in a way never intended by nature and where once a single worm existed, there are now hundreds. The balance struck between host and parasite has been broken down. This is none the less serious because the animal is often able to survive; it causes a loss in vitality and condition which is the more important because the stock owner is so often unaware of its existence.

Ancient Times.

Many of the larger helminths were well known to the ancients and some must have forced themselves on the notice of the earliest nomadic herdsmen. Certainly the ancient Egyptians, the Jews, the Greeks and the Romans knew of many of the larger species; but we must be careful in interpreting their old statements and customs in the light of modern discoveries and avoid the mistake of crediting them with more than they actually knew. Astute observers as they were, there is no reason, for example, to believe that the taboo on pork issued by the nomads of the fertile crescent of Asia Minor was due to a knowledge of trichinosis and cysticercosis. It is much more probable that their tribal forefathers regarded the pig as a totem animal. The Jews do refer to helminthic cysts, however, and the Greeks also were well acquainted with the adult tapeworms. The Romans even went the length of erecting an altar to the god *Verminus* on the occasion of an outbreak of cattle disease in Southern Italy.

Ectoparasites were, of course, recognised at a very early date and Cato mentions mange in sheep as long ago as 160 B.C. Sheep scab was one of the most important of early British diseases and the first recorded import into these islands is Archangel tar for the cure of this condition. The parasite was only discovered, however, in 1809 by Walz.

The first internal parasite to be definitely regarded as important in animals appears to be *Cysticercus cellulosæ* in the muscles of pigs. Aristophanes, in one of his plays, makes a slave exclaim "Let us force a stake into his mouth as do the cooks, and then, by pulling out his tongue, we will examine, boldly and at our ease, his wide-opened mouth to see if he is 'measled.'" In the middle ages, many of the German states introduced legislation to deal with this parasite. In 1276, for example, the city of Augsburg ordained that "if a butcher kill a measly pig, he shall sell it to no one without a statement of this fact." The gid parasite was well known to the old stock-keepers, but was usually regarded as a degenerate sheep nostril-fly (*Œstris ovis*) until 1780, when Leske showed its true nature. Hydatid too, has a similar history and was thought to be a morbid process until the time of Redi and Tyson in the second half of seventeenth century. In 1780 a society was formed in Denmark to investigate this parasite. Two years later, its relationship with the Tænias was recognised by Goeze, and in 1786, it was named *Hydatigena granulosa* by Batsche. Eighty years were to elapse before its life cycle was fully investigated by Leuckart.

In **1682**, a new impetus was given to medicine and to zoology by the discovery of the first intestinal flagellate by Leenwenhoek; while the introduction of the binominal system of nomenclature by Linneaus in **1758** and the collection of all the existing information on parasites by Rudolph in **1808**, saw the beginning of the science of parasitology.

Since the time of Rudolph, there has been considerable activity in parasitology, broken only by the short interregnum when bacteriology held the field. It is impossible to chronicle all these events in an article such as this and so a compromise has been reached by taking the more outstanding discoveries in chronological order and describing the events which gave rise to them and their consequences.

The Trichina Worm.

In 1828, Peacock discovered the larvæ of the Trichina worm in an Italian who had died in London, but they were not described until seven years later. In 1846, Leidy discovered the same species in pigs in America and in **1850**, Herbst introduced experimental methods by successfully transmitting them by feeding experiments. The life cycle was completed by Leuckart in 1855 and Virchow in 1859, who showed that the larvæ became adult in a few days after feeding to experimental animals. In 1860, Zenker described human trichinosis and since that date the parasite and the disease have been continually in the literature. At one time the condition became an important international problem between America and Germany and was at once a problem and a stimulus to the young American Bureau of Animal Industry. It is of interest to note that it is still endemic in London and other parts of Britain, although the disease is only serious in lands where raw or smoked pork is consumed.

The Cestodes.

While adult tapeworms and tapeworm cysts had been

known from the very earliest times, it was not until **1851** that Kuckenmeister fed the cysticerci of the rabbit to a dog, and thus showed that they were the larval stages of *Tænia serrata*. Pallas, it is true, in 1776, had drawn attention to the resemblance between the bladder-worms found in the liver of mice and the adult tapeworms found in the intestine of cats; but he has left no record of any experimental evidence and it is to Kuckenmeister that we owe our first real proof of the larval nature of these cysts.

The first life-cycle of a veterinary parasite involving an Arthropod vector was that of *Dipylidium caninum*, found by Leuckart and his pupil Melnikoff in **1869** to be transmitted by the biting-louse of the dog. This is not the earliest record of a parasite being carried by an arthropod, however, as Leuckart had shown two years before that the stomach worm of mice had its larval stage in insects; and even earlier (1672), Lister had found the semi-parasitic gordian worms in water beetles—those same worms which are still popularly believed to arise from horse-hairs thrown into ponds.

The remaining group of cestodes parasitic in animals has had to wait until modern times for the full solution of its life-cycles. Braun in 1882 showed that *Diphyllobothrium latum* of man and dogs had an infective stage in fish, but that the life history involved an earlier state in a minute water crustacean was not discovered until 1917 when Rosen showed that the larvæ must hatch from the eggs, be swallowed by a Cyclops, which in turn must be swallowed by a fish, before the stage infective to mammals was reached.

The Guinea-Worm.

In the same year that Leuckart and Melnikoff were discovering the cysticercoids of the dog tapeworm in the louse, Fedschenko was able to show that the Guinea-worm—the fiery serpent of the Exodus—were carried by a Cyclops. The inspiration for this investigation had come from Leuckart, who was struck with the similarity between the larvæ of the guinea-worm and that of a nematode found in the perch which was transmitted in a similar way. The development of the parasite in the definitive host is still unknown, although Leiper in 1907 demonstrated that infection was caused by the accidental swallowing of the infected crustacean.

The Filaria Worms.

In **1877**, another fundamental discovery was made in connection with intermediate hosts. In all those previously investigated the eggs or larvæ had been passed to the exterior of the host and there been ingested by the intermediary. In that year, Manson was able to show that the filaria larvæ found in the blood of man at night, were actually abstracted from this closed circuit, by a blood-sucking insect in which an essential development took place. The larvæ subsequently return in an infective state through the skin when the insect again sucks blood.

The first animal species to be found to have a similar life cycle was *Dirofilaria immitis*, found by Leidy in 1856 in the heart of the dog and since discovered in all the warm parts of the world. In 1900, Grassi and Noé discovered that it also was transmitted by various species of mosquitos and seven years later showed that *Acanthocheilonema grassi* of the dog was transmitted by a tick. The common filarias of ungulates belong to the genus Setaria and in no case is their life cycle known, although Stomoxys has been strongly suspected.

Related to them, however, is another genus, called *Onchocerca*, which is of considerable economic importance. It lives in a subcutaneous position and forms the worm-nodules so well known in Australian cattle. Several species exist in animals, but in these, too, the life history is unknown. One species, however, occurs in West Africa in man (*O. volvulus*) and in 1926 Blacklock showed that it was carried by a small buffalo-gnat (*Simulium dammosum*) and two years later Cameron described from cattle from the same region a morphologically identical species.

The Flukes.

Fasciola must have been known long before it was first reported in 1379 by Jehan de Brie from cases of liver-rot in sheep. The name Trematode was not introduced until used in 1808 by Rudolph; previously these animals had been called "sucking worms" and regarded as related to the leeches or even as immature fish which had gained access to the body in some mysterious way (the popular name of Fluke, comes from the old Anglo-Saxon Floc, meaning a flounder). The life cycle as we know it now was finally pierced together by Leuckart and Thomas in **1883**, but their work was merely the culmination of a number of observations which had been made by older naturalists and affords an excellent example of the fact that no new discovery arises suddenly.

In 1773 Müller described (as Protozoa) small tadpole-like creatures which he and previous workers had found in ponds; he gave to them the name of Cercaria. Swammerdam in 1680 had seen similar animals emerging from Paludina, but his work had been overlooked and so no significance was given to Müller's protozoa until 1818, when Bojanus described redia from snails and six years later von Baer saw Müller's cercariæ emerging from them. In 1831, Mehlis described the ciliated larvæ which arise from the eggs of certain flukes and in 1842 Steenstrup brought these scattered facts together to illustrate his new theory of the alternation of generations and described the typical life-cycle of a fluke. Later both Thomas and Leuckart experimentally showed that the sheep liver fluke passed through such a change in the small pond snail we now know as *Limnæa truncatula* and in modern times other observers have found related species in other parts of the world have become adapted to carrying the same parasite.

The group of amphistomes so common in the rumen of sheep and cattle and the intestine of horses have been known for a long time—the forms in cattle are eaten raw by African natives; but the first mention of it in literature is by Zeder in 1789. Since then a large number of species have been described and several important monographs written on the subject. We have little knowledge yet, however, of their specific life histories but, in general, they seem to follow that of Fasciola very closely.

Many other flukes have been investigated since Leuckart and Thomas's time, and while in every case the life cycle in snails closely follows the lines first described by Steenstrup, the fate of the cercaria varies. If the definitive host is a herbivore, the cercaria generally encysts on vegetation; if a carnivore, it encysts in animals which form the food of the host. In a few cases it actually penetrates the skin—and this is the case in the blood-flukes.

The first of these parasites to be described was *Schistosoma hæmatobium* by Bilharz in Egypt in 1851; it was not until 25 years later that Sonsino found *Schistosoma bovis* in sheep and cattle. In 1904 Katsurada found another species in the cat—later in many other mammals—in Japan; and in 1906, R. E. Montgomery described three new species from domestic animals in India; in 1929, le Roux and Veglia described a sixth animal species from sheep in South Africa. Although a considerable amount was known about the morphology of these species—particularly from the monographs of Looss and Montgomery—little was known of their life-histories until 1914, when various Japanese workers discovered the intermediary of *S. japonicum*. The following year, in a brilliant piece of inductive research, Leiper elucidated the life cycle of the two human African species and found that one was carried by a snail called Planorbis and the other by a Bullinus. Subsequently three of the animal species were found to be carried by the same genera of snails; all, curiously enough, very far removed from the carrier of the Far Eastern form.

Babesia and its Relations.

Manson's discovery of the rôle played by the mosquito in carrying the human filaria worm was not without its effect in other branches of parasitology and we must now turn our attention to the protozoa. Ross's work on the mosquito and malaria was one of the most important consequences of Manson's work, but before this was done, Smith and Kilborne had commenced their research on the malaria-like parasites of cattle and in **1893** published their epoch-making report on bovine babesiosis. The parasite had been, unknown to them, discovered in Europe by Babes in 1888 but Smith and Kilborn did more than discover the cause of the notorious Texas fever; they found that it was conveyed from ox to ox by a tick and that the infection was passed from the infected female tick, through the egg, to make the young tick infective. Subsequently other species were discovered, both in cattle, and in horses and sheep and dogs; but in every case the disease was found to be tick borne.

In 1903, however, Theiler recognised a new kind of blood parasite in cases of coast fever in Africa and this parasite has since been named *Theileria parva*. The disease was well known to the early Dutch settlers, and the parasite was actually seen by Koch in 1898, but he believed that it was a stage in the growth of a Babesia. Similar forms have since been found in other animals, and, like Babesia, they are carried by ticks.

Trypanosomes and Tsetses.

In 1880, Evans had discovered the trypanosome parasite of surra, but it was not until **1895** that Bruce was able to show that the very fatal African N'gana was also caused by trypanosomes which were carried from game to domestic animals by a species of tsetse fly; it was left to Kleine in 1909, however, to show that an essential development of the trypanosome took place within the fly. In 1896, Rouget found that dourine of horses was also a trypanosome infection, and although, like surra, this condition could be mechanically transmitted by the bite of flies, it is normally transmitted through coitus. Within the next dozen years at least as many valid species of trypansomes were found in Africa and elsewhere—together with an innumerable number which were not new. Some, like Bruce's species, are carried by tsetse flies in which a cyclical development takes place; recent investigations have shown that the cyclical development varies with different species of parasite. All can be carried mechanically by blood sucking arthopods; some, like Evans' species, are only carried that way, but the parasite of dourine alone can dispense with an arthropod vector.

The Hookworms.

Our knowledge of the hookworms of man and of animals is of relatively recent date; but they are among the most serious of the nematode parasites. *Ancylostoma duodenale* was described by Dubini only in 1842, and the other and more common human species were not recognised until 1902, when Stiles gave it the name of *Necator americanus*. Both, however, must have been seen much earlier, and the disease which they cause was known in very ancient times. The animal species have an older recorded history. The sheep hookworm was described by Rudolph in 1808, while Chabertia is even older—dating from 1788. *Ancylostoma caninum* was recognised in dogs in 1859, and the other canine species probably even earlier. Globocephalus was described from pigs by Molin in 1861; and since then several other species have been found, including the cattle hookworm in 1900 and a species of Necator in pigs in 1922.

In **1896**, Looss demonstrated that the larvæ of the human hookworm penetrated the unbroken skin, and later produced his classical monograph on this species—a monograph based to some extent on a study of the related species in dogs. In 1923, Cameron showed that the sheep hookworm was not a skin-penetrator, although its life cycle was otherwise similar and in 1927, he described the parasitic development of the same species.

The parasite of gapes in chickens and other fowls had been known for many years and has recently been the subject of extensive study by Ransom, Ortlepp, and other investigators. Its life cycle is also direct, although it can be mechanically carried by earthworms.

The Sclerostomes of Horses.

Until **1901**, it was generally accepted that two species of sclerostome inhabited the large intestine of equines. In that year Looss published his now famous monograph describing 19 distinct species from Egypt, with a detail never since equalled. Subsequently, other workers described other forms and there are now about 60 species in at least 14 genera recognised. A considerable amount of work has been done on the biology of these forms, but we know relatively very little about their parasitic development yet, except that it is somewhat similar to that of the hookworms, but involves a necessary migration, in some forms at least, to other parts of the body before reaching maturity. It is probable that, in all cases, the infective larva must be swallowed to cause the infection and during its free life it is very resistant to adverse influences.

Related to this group are the œsophagostomes of pigs and ruminants, some species of which cause the condition known as " pimply gut " and are very pathogenic. They have been known since Rudolphi's time (1801) but our modern knowledge is mainly due to the studies of Goodey (1924-26). Their life cycles are on similar lines.

The Spirurid Worms.

This group of nematodes lives in the stomach and œsophagus of many species of animals and, so far as is known, is always carried by an intermediate host. The first species

studied was Protospirura of mice by Lueckart in 1867; but our modern knowledge of the group is largely due to the researches of Ransom, Foster and Seurat.

The common spirurid of horses belongs to the genus Habronema and one species of this genus was found in 1860 by Carter to be present in a third of the house flies captured in Bombay. It was not until **1911**, however, that Ransom was able to show that this was one of the equine species. The embryos of the worm passed in the fæces of the horse are swallowed by the fly maggots, and when the mature fly is formed, they migrate forward to the proboscis. Ransom showed that infection was possible by horses swallowing such flies; but subsequently it has been found that it is not necessary for the fly to be swallowed and that the larva can escape on to the lips. It can also escape on to any other warm, moist surface and in this way has become associated with "summer sores," and there are some grounds for believing that it may migrate from these cutaneous sores to reach the lungs and perhaps the stomach.

Other species in domestic animals notably Gongylonema of ruminants and pigs, Arduenna and Physocephalus of pigs, Spirocerca of dogs, and Spirura of cats, are likewise transmitted by various beetles and cockroaches.

The Trichostrongyles.

While some of the larger species of hair-like strongyles found in the stomach and small intestine were known to Rudolph, it is mainly to the monographs of Ransom (1911) and of Travassos (1921) that we are indebted for our modern knowledge. Most of that is comparatively recent and has been the result of the work of many investigators. Perhaps the most outstanding of these are Veglia's two monographs on the morphology and bionomics and on the chemotherapy of Hæmonchus, the first published **in 1915** and the second a few years later. Trichostrongyles in domestic carnivores are limited to a single peculiar species in cats, discovered in Germany by Leuckart and called by him *Ollulanus* and studied recently by Cameron in Britain, who has shown that it could be transmitted directly from cat to cat through the vomit. Not only does it differ in its mode of transmission from the other species; it produces living larvæ. The single species in the stomach of the pig has recently been the subject of a detailed investigation by Goodey.

The Ascarid Worms.

Ascarid worms have been known in practically all of our animals for many years and the life cycle has long been known to be direct. It was not until **1916**, however, that Stewart's experiments, followed by those of Ransom, Foster, Cram and Fülleborn, showed that the larva, after hatching from the egg in the intestine, underwent a complicated, necessary journey in the bloodstream, through the liver, to the lungs, before returning to the intestine to take up its final and permanent habitat. This is now generally accepted to be a phylogenetic reminiscence of a time when an intermediate host was essential to the life history of the parasite and is a fact of great clinical importance owing to the frequent occurrence of pneumonia in heavy infections. Moreover, it renders pre-natal infection of young animals a possibility. A satisfactory scheme of prevention has been worked out by Ransom and is responsible for the saving of millions of pounds in the American pig industry. This consists essentially in the cleaning and disinfecting of female and stables before parturition, birth in a clean environment and segregation of the young in this clean environment for at least four months, after which the infection ceases to be dangerous.

The Lungworms.

Lungworms, which, in spite of their name, sometimes live in the blood stream, are known to occur in all of our domestic mammals. They have been the subject of several monographs—notably by Kamensky in 1905, Neveu Lemaire in 1917, Leiper in 1926 and Cameron in 1927. Until 1926, however, the only life cycle known was that of Dictyocaulus, the genus inhabiting the larger air passages of ruminants and horses. This was direct, the larva moulting twice to become infective and being swallowed with grass by the appropriate host. In **1926**, Cameron showed that the lung worm of the cat was transmitted by mice, in which it underwent a developmental cycle; and in 1929, Hobmaier showed that Metastrongylus in pigs required to develop in earthworms before becoming infective and that a similar development in gastropod molluscs was essential in the case of *Muellerius capillaris* of sheep. Infection of the definitive host is apparently *via* the lymphatic system and not *via* the liver as in Ascaris. Until recently, the lungworms have generally been regarded as aberrent strongyles, but Hall has recently put forward the view that they should rather be considered as related to the Spirurid worms.

Anthelmintic Medication.

The treatment of worm diseases is one of the oldest branches of medicine, and we still use some of the drugs first used before the time of written history. The Greeks gave us male fern, the Indians and the Chinese, Areca nut and pomegranate bark, the Arabs, Kousso and Kamala, and the American Indians oil of wormseed or Chenopodium.

Most of these drugs were in use against tapeworms; they were the stock-in-trade of the mediæval physician and few advances in their use were made until **1884-1886**, when a group of Italians, Grassi, Calandruccio and Perroncito, studied the use of male fern in cases of liver-fluke disease and first ushered in the methods of experimental investigation and anthelmintics.

A number of new drugs have been introduced into general use since then, but the most important of these is the introduction of carbon tetrachloride by Hall in **1921**—a drug which has proved to be of the utmost value in both human and veterinary parasitology; but which may be replaced in the future by a related drug introduced in **1925** by Hall and Shillinger and known as Tetrachlorethylene. Other drugs of fairly recent introduction are Arecoline hydrobromide for tapeworms, copper sulphate for roundworms in ruminants, and antimony and arsenic compounds for somatic infections.

Among the parasiticides—drugs for external application—in addition to the time-honoured tar and the coal-tar compounds, the most important introduction is arsenic.

Immunology.

This is the most recent branch of parasitology and is too new to admit of a detached survey. In the past, immunology has been the handmaiden of bacteriology and workers have lost sight of the fact that immunology is the study of the reactions of the animal body to the causes or

products of disease. An antigen may be a parasite just as well as a bacterium or a virus. So far, the study of this subject has been mainly devoted to cutaneous reactions of parasitic infections and to anaphylaxis. But there is no doubt that it will make further progress as more workers become available. The most outstanding contributions, so far, are in the realm of human parasitology and comprise reliable diagnostic tests for various helminths and protozoa.

Bibliography.

This review cannot be closed without a reference, however brief, to the bibliographical services under the direction of Stiles and Hassell in the United States. Without the invaluable aid provided by their various index catalogues it would be impossible to keep in touch with the enormous literature which has grown up in all parts of the world. Stiles, in addition, has contributed more than any other to the stabilisation of the names of parasites. Troublesome as it has been in the past, but for his work the position in the future would be well nigh impossible.

Conclusion.

No retrospect is complete which confines itself to a mere description of facts and takes no cognizance of their meaning or of the trend of events. This short history has only summarised the main facts and has left untouched many other discoveries and applications of discoveries of enormous importance. The rôle of the historian—especially of a historian who, in his history, approaches near to his own time—is notoriously a difficult one. Facts should be interpreted impartially and without bias; but the history must inevitably be coloured, no matter how faint the tinge, with the historian's own prejudices. Facts which, to him, seem of fundamental importance, to others seem of little moment. If the rôle of the historian is difficult, that of the prophet is well nigh intolerable. Yet it seems inevitable that the general trend of research in the past should be briefly indicated and an attempt should be made to say where it will lead us. But history never repeats itself and we must walk warily.

Our history has shewn that parasitic diseases in the primitive state are not important; that parasitism is so common as to be a normal state of affairs rather than an abnormal. Yet as bacterial and virus diseases come more and more under control, as agricultural science makes possible a larger and still larger population on a limited area of ground, and as tropical expansion becomes more and more progressive, it seems that parasitism must become more and more important. Bacteriology has reached its zenith; the ultra-visible viruses, which may be either plant or animal or neither, hold the field at the moment; the future is with parasitology. Parasitic diseases are serious only when the host is a new one—and this is equally true whether the newness be of years or of species—or when numbers multiply and nutrition becomes lowered—or when, more rarely, the parasite uses the mammal as an intermediate host or mechanically interferes with some vital function of the body. Helminths in young stock, tsetse fly disease in cattle in Africa, roundworms on permanent pastures, gid, and ascarids in the bile ducts are examples in point. But helminths can cause disease in another way; by admitting the pathogenic protozoa or bacteria to the blood stream or by acting in association with some other sub-pathogenic condition. These conditions are fulfilled relatively uncommonly in the natural state; it is when man's impatience to advance is in danger of causing that most dangerous of all things—upsetting the balance of nature—that serious results occur. The rapid transport of non-immune animals to new localities where a different parasitic fauna is found; the permanent retention of animals in a confined space; the lack of treatment or non-recognition of the carrier; these are the conditions which breed danger to his flocks and herds.

If adequate protection is to be afforded to the stock owner it will need many more workers in what is admittedly a more difficult field than Bacteriology; it will need more adequate surveys of the parasites of the different districts of the world, more adequate study of the bionomics of parasites and their vectors, more research into drug treatment and adequate applications of the knowledge gained in the laboratory to practical problems in the field, more thorough training of veterinary surgeons in Parasitology. Many of the problems of the past, and of the future, too, have been and can be resolved by the pure zoologist; but the application of these is essentially the business of the veterinary practitioner and the veterinary hygienist. An interpreter must know both languages, and so the field worker must know both Zoological Parasitology as well as Veterinary Medicine. The signs are indicative of such a training in the future. The biological sciences are becoming more and more important, and more time is being given to practical work in the curriculum. Edinburgh has commenced a new Diploma in Tropical Veterinary Science, in which Parasitology and Entomology are major subjects. The Colonial Office is demanding a biological degree or its equivalent from its future veterinary officers. This is the position and outlook so far as Britain is concerned; and the outlook is promising.

Agricultural Returns for Ulster.

Increases in Horses, Sheep and Pigs.

The agricultural returns for Northern Ireland for 1930 show a decrease of 28,212 acres in the ploughed area, principally attributable to reduced acreage under oats, potatoes, and flax.

A decline in the number of cattle is again recorded. The total number is 673,030, which is the lowest since 1926. A decline of 11,809 has occurred in the number of milch cows, but heifers in calf show an increase of 4,144. Sheep flocks continue to increase, and an upward movement of 48,169 has occurred this year, the number of breeding ewes having increased by 20,482. A new high record is created by a total sheep population of 702,758. Pigs have increased by 24,366.

Poultry have increased by 498,325, or six per cent. The number of ordinary fowl increased by 522,322, but a decrease in the turkey flock is reported, the figures being 35,945 and 8·6 per cent. Geese also declined, by 10,353.

The number of agricultural horses shows an increase of 1,343, or 1·6 per cent.

Administrative Section.

The Administrative Veterinary Services of the United Kingdom.

By D. S. Rabagliati, O.B.E., B.Sc., F.R.C.V.S., D.V.S.M., Wakefield.

The official Veterinary Services of Great Britain consist essentially of two classes, that is if we do not take into account the Royal Army Veterinary Corps. These are, first the Diseases of Animals Division of the Ministry of Agriculture and Fisheries, and secondly, the Municipal Veterinary Services. The latter may again be divided into two categories, namely, the Municipal Services of the towns and secondly, the County Services organised by the County Councils. Concerning no branch of veterinary science has public opinion changed so materially in late years as on that which deals with the control of contagious diseases amongst our domestic animals, but it is really only since the war that the control of animal-borne disease in mankind has received anything like the importance that it deserves. It is thus only in very recent years that the public, and through it the Government and its Local Authorities, are beginning to look to the veterinary profession for advice on this subject, and even now to " the man in the street " the value that the profession can be to him is but too little understood and appreciated. Although the Government control of animal disease dates back for more than sixty years, it is only since 1919 that the veterinary service has been under the direct personal control of the Chief Veterinary Officer of the Ministry, since when it has appreciably advanced in standing and efficiency, but it is in the services under the Local Authorities, which twenty-five years ago were practically non-existent, that the greatest strides have been made during this period.

The power to deal with animal disease is contained in the Diseases of Animals Acts, 1894-1927, and by certain Orders made from time to time thereunder. These Orders, which have the same force as an Act of Parliament, are made by the Minister of Agriculture to deal with specified diseases as occasion arises. In addition to making Orders for the control and eradication of disease, the Minister may make Orders for other purposes such as :—

(*a*) The declaration of infected places and areas.

(*b*) The prohibition or regulation of the movement of animals, into, out of, or within such places and areas, and of the exposure of animals at markets, sales and exhibitions.

(*c*) The control of the importation of foreign animals, carcasses, fodder, etc., for the purpose of preventing the introduction of disease from without.

(*d*) The muzzling and control of dogs, and

(*e*) The protection of animals and poultry from unnecessary suffering during transit by land or sea.

The Diseases of Animals Act of 1894 was a consolidating one which incorporated all previous Acts dealing with animal diseases. It may be of interest to mention that there was no organised attempt to deal with animal diseases in the United Kingdom until 1348, when two Acts were passed to deal with sheep pox which was then decimating our flocks. The cattle-plague outbreak in 1865 led to a further one being passed by Parliament in 1866 and a Contagious Diseases (Animals) Act in 1869, but it required another severe outbreak of cattle plague and also epizootics of foot-and-mouth disease and contagious pleuro-pneumonia to bring about the more general Act of 1878, which was the precursor of the main Act of the present time, namely, that of 1894.

Even twenty-five years ago there were ten diseases scheduled, and since that date only three new ones have been added, namely, epizootic lymphangitis of the horse, in 1905, made necessary after the South African War, and certain forms of tuberculosis in cattle in 1913, although this Order was suspended early in the Great War and re-introduced with certain modifications in 1925. The third new disease to be included was contagious bovine abortion, in 1922. The scheduled diseases at present are :—Cattle plague or rinderpest, contagious bovine pleuro-pneumonia, sheep pox, foot-and-mouth disease, swine fever, anthrax, epizootic lymphangitis, parasitic mange in equines, sheep scab, glanders and farcy, rabies, tuberculosis in some forms and contagious abortion for some purposes. No case of sheep pox has occurred in Great Britain since 1850, cattle-plague has not been seen since 1877, contagious pleuro-pneumonia since 1898, epizootic lymphangitis since 1906, rabies since 1922, and it is now more than four years since a case of glanders has been confirmed in the country.

The control of contagious scheduled diseases is vested in the Ministry of Agriculture and Fisheries, and while certain conditions are dealt with by the veterinary staff of the Ministry, the control of others falls on the Local Authorities and in a few cases the regulations are carried out in part by the Ministry's staff and in part by those of the Local Authorities. Thus, cattle-plague, contagious pleuro-pneumonia and sheep pox, should they again make their appearance in the country, would be dealt with by the Ministry's staff, as also are foot-and-mouth disease and swine fever at present. Anthrax, sheep scab, glanders and rabies are controlled partly by the veterinary officers attached to the Ministry and partly by those of Local Authorities, while parasitic mange in eqines, epizootic lymphangitis, tuberculosis and contagious abortion are controlled by Local Authorities. The only forms of acariasis made notifiable are sheep scab and sarcoptic and psoroptic mange in equines.

For purposes of animal diseases in England and Wales, the Local Authorities are the councils of certain boroughs which, according to the census of 1881, had roughly a population of 10,000 or more, of which there are at present 209, and for the remainder of the country, the County Councils, which number 63. In Scotland the Local Authorities are the councils of burghs, which according to the same census had a population of at least 7,000, of which there are now 22, and the County Councils, which total 31. To control contagious disease, the Chief Veterinary Officer of the Ministry has now a staff of 104 qualified veterinary surgeons and ten lay inspectors with an adequate clerical staff under his command and, in addition, about 250 veterinary surgeons in private practice who give part-time service and are remunerated according to the work actually done by them. As occasion arises—if, for instance, an epizootic of foot-and-mouth disease visits the country

—additional temporary staff is recruited to cope with the work. Until 1919 the Director of the Diseases of Animals Division of the Ministry was a lay Assistant Secretary of State, and looking back only twenty-five years we find that this officer then had only one Chief Veterinary Officer, 23 qualified veterinary assistants and 38 lay inspectors, who were not veterinary surgeons, on his permanent staff. The ten lay inspectors remaining on the staff to-day will, as they retire, be succeeded by qualified veterinarians.

The powers of the Ministry under the Diseases of Animals Acts also apply to Scotland, which for all other matters of an agricultural interest has a Board of Agriculture of its own, the Minister of Agriculture in London having no jurisdiction in Scotland except as stated.

Owing to the menace of introducing animal disease into the country, no cattle, sheep or pigs are allowed to be imported alive into the country other than from Ireland, except the following :—

(1) Store cattle, incapable of breeding, from Canada, under the Importation of Animals Act, 1922.

(2) Fat cattle from Canada, the United States of America, and the Union of South Africa, subject to slaughter at the ports of landing.

(3) Pedigree breeding stock from the British Empire, subject to such period of quarantine as is considered necessary; and

(4) Animals admitted for exhibition or other exceptional purposes, which are also subject to strict quarantine.

The method of dealing with outbreaks of disease varies considerably in respect of the disease in question. In the case of cattle-plague, contagious pleuro-pneumonia of cattle, sheep pox and foot-and-mouth disease, the affected animals as well as any which have been either directly in contact or otherwise exposed to infection are immediately slaughtered. Machinery also exists for controlling all movement of animals over a prescribed area of the country in outbreaks of foot-and-mouth disease. All glandered horses, asses and mules are slaughtered, along with reactors to the Mallein test, and in-contacts isolated until proved to be free from the disease. Dogs and cats affected with rabies are killed and also any known to have been bitten by a rabid animal. Animals which have been in contact are carefully isolated until all danger is past. No dog, cat or other canine animal can be imported into the country without undergoing a period of strict quarantine for six months. Cattle affected with any of the prescribed forms of tuberculosis must be slaughtered, but there are no powers to deal with in-contact animals if not themselves diseased as defined by the Order. The slaughter policy for dealing with swine fever has of late years been given up, but affected pigs must be isolated until the disease has died down. In-contact pigs may be treated with swine fever serum and left along with affected pigs, but slaughter is at the discretion of the owner and is not now compulsory. Horses suffering from epizootic lymphangitis must be isolated, as well as any thought to have been exposed to infection, for as long as may be required. Equines affected with parasitic mange must be kept isolated under certain conditions and may be treated by remedial measures. Sheep affected with sheep scab, as well as those which have been exposed to infection, must be isolated from all other sheep and treated by a process of double-dipping with approved sheep dips until free from infection. In the case of anthrax, animals suspected or affected must be kept isolated, but as the disease is rarely diagnosed prior to death, the regulations chiefly consist in rendering the carcasses of diseased animals harmless by fire or other means. Premises where disease has existed are kept under close observation and all movement of animals, either on or off, is prohibited for a time. Contagious abortion is only scheduled in that it is not lawful to expose a cow which has aborted within two months in a sale or market, or to turn such an animal out on common land or to sell it without giving notice of the fact to the purchaser.

The Ministry's veterinary service also includes a fully-equipped Research Laboratory situated at Weybridge. In this institution research into various diseased conditions is actively carried on and, in addition, diagnosis is carried out on material sent from all over the country and certain sera and vaccines are manufactured and issued to veterinary surgeons as required. The Laboratory is controlled by a Director, who is also the Director of the Imperial Bureau of Animal Health, assisted by a staff of research officers and others. In addition to this laboratory there are two others recognised by the Government for animal diseases research, the one in London and the other at Cambridge.

The Municipal Services.

Under the Diseases of Animals Acts, every Local Authority must appoint one or more veterinary surgeons to act as veterinary inspectors to carry out the examination of animals suspected of suffering from any of the scheduled diseases. These officers may be whole-time, but are more often practising veterinary surgeons appointed to act for the Local Authority when required. This is the minimum required by law. Certain Authorities have now appointed whole-time veterinary officers who not only carry out the duties imposed by the above Acts, but also are responsible for certain duties of a public health nature connected with the production of milk and the inspection of meat, fish and even other foods. Under the Acts and Orders previously referred to every owner or person in charge of any animal is legally bound to give notice of the existence or suspected existence of any of the scheduled diseases in any animal or sometimes a carcass under his charge—with the exception of contagious abortion of cattle which is not so notifiable—to a police constable or to an inspector of the local authority in the area in which the animal is. It is then the duty of the police or inspector to take certain action as prescribed under the Order dealing with the disease in question and to call in a veterinary inspector to refute or confirm the suspicion of disease. If disease is found to exist, it is then the duty of the veterinary inspector to advise the police as to the measures to be taken. Should the disease, however, be one to be dealt with by the Ministry of Agriculture, the Ministry is immediately informed and the outbreak handed over to its veterinary officials and the responsibility of the veterinary officer of the Local Authority ceases in-so-far as the infected premises are concerned, although he may be asked to assist the staff of the Ministry in the examination of in-contact animals or in tracing the source of the infection. If, on the other hand, it is one falling within the scope of the Local Authority, it is then the duty of their officers to carry out the necessary regulations

The part played by the veterinarian in the production of clean milk has greatly increased in late years, for up to comparatively recently, except in a few of the larger cities, this sphere of his work was greatly neglected. Twenty-five years ago the regulations dealing with milk and milk-producing cattle were chiefly contained in what were known as the Dairies, Cowsheds and Milkshops Order of 1885, amended by the Orders of 1887 and 1899, and in Scotland also the Cattlesheds in Burghs (Scotland) Act of 1866, and the Burgh Police (Scotland) Act of 1903. In these Acts and Orders there was no adequate provision for the inspection of milk cows and no special mention was made of the veterinary officer at all as regards England, although things were somewhat better in Scotland. Power was, however, given for an Authority to make bye-laws which might include an examination of the cows, though not necessarily by a veterinary surgeon. In England especially, but few Authorities made use of this provision. Certain of the larger cities obtained special Acts of Parliament enabling them, amongst other provisions, to insist on farmers disposing of cows suffering from tuberculosis of the udder or tuberculous emaciation, but there was no power to have these animals destroyed, and they could be and frequently were, sold to farms outside the city boundaries, where they might again be used for the production of milk. The special Acts referred to permitted the officers of the city to inspect cows kept outside their own boundaries if it could be shown that tubercle bacilli were present in bulk samples of milk supplied within the city area. In 1913, an Order, known as the Tuberculosis Order of 1913, was introduced giving power to Local Authorities to slaughter all cows suffering from tuberculosis of the udder or giving tuberculous milk, or any bovine affected with tuberculous emaciation or having a chronic cough and showing definite clinical signs of the disease. This Order was, however, suspended owing to the Great War, after it had been in operation for a few months only. In 1914 a completely new Act was drawn up to deal with milk and its production in England and Wales and a corresponding one for Scotland. Their coming into force was, however, postponed owing to the war, and they only became operative in September, 1925, when at the same time another Tuberculosis Order was re-introduced. Owing to the original postponement of the above Acts, shortly after the end of the war a Milk and Dairies (Amendment) Act was placed on the Statute Book in 1922. The chief importance of this Act was that it gave power to the Minister of Health in England and Wales, and to the Scottish Board of Health in Scotland, to issue the Orders which provide for the licensing of " Certified " and Graded milks. Finally, as the result of the new legislation, the Milk and Dairies Order of 1926 was issued for England and Wales. Under the terms of the Scottish Act, such an Order was not necessary. This Order, amongst other provisions, grants permission to Local Authorities to institute a regular veterinary inspection of all cows producing milk for sale, to be carried out by properly qualified veterinary surgeons. It must be added that, while this power is merely permissive in England and Wales, it is compulsory in Scotland under the Scottish Act. This brief summary of recent legislation shows the trend of public opinion in the employment of the veterinary profession more and more for public health measures.

Twenty-five years ago there were but very few whole-time municipal veterinary appointments and practically no veterinary departments as we understand them to-day. Those which did exist were in a few of the towns, there being none at all in any of the counties. The honour of making the first whole-time county appointment belongs to Lanarkshire, which in May, 1910, first took this step. This was followed by several other Scottish Counties and as the Milk and Dairies (Scotland) Act of 1914 virtually provides for whole-time veterinary officers unless special exemption is granted by the Scottish Board of Health, these appointments have been made more quickly than has been the case in England and Wales. The first English county to form a veterinary department was Cumberland, which made the first appointment in 1913—to be followed by one county in Wales in 1925, and by the West Riding of Yorkshire in 1927, although many towns have seen fit to appoint a permanent veterinary staff in recent years. At the present time there are 12 counties and 20 boroughs in England and Wales, including London and the Channel Islands, with what may be termed a veterinary department, and in Scotland 14 counties and 5 burghs. In a few districts a certain amount of veterinary public health work is done by part-time veterinary officials. As there are no hard and fast rules as to the scope of these departments the duties vary considerably in different localities.

The regulations concerning the inspection of meat are different in England and Wales from what they are in Scotland, where the veterinary surgeon is more recognised for this purpose. The result is that the part played by the veterinarian in the inspection of meat is by no means uniform, but as this subject is discussed in another article appearing in this issue, it need not be further mentioned here.

It may be as well briefly to summarise the scope of the veterinarian in municipal and county appointments. In the first place this officer should have full control of the Diseases of Animals Acts and Orders in so far as they affect the Local Authority. He must be in the closest possible touch with the police who are not only the greatest help to him but frequently a necessity in carrying them out, as these Acts and Orders are so framed as to place great responsibility on to the Police Force. As probably the health of the cattle is the most important factor in ensuring a clean milk supply, the veterinarian is essential in the administration of the Milk and Daries Acts and Orders. Moreover, as health is not possible without suitable housing conditions, the general supervision of the buildings used for housing the cattle should also be under the veterinary officer. In this he should be assisted by properly qualified assistants in areas where the number of milk-producing farms warrants it. It naturally follows that the supervision of the conditions under which milk is produced should be under the same staff in close co-operation with the Medical Officer of Health. This procedure is now frequently adopted by many of our larger cities and leads both to economy in working and greater efficiency as the dual control is dispensed with. The position in an English county is on a different plane from that in a County Borough, in that in the former the control under the milk and dairies legislation is dual, the district sanitary council being responsible for the supervision of milk production except that part which concerns the health of the cattle

which falls on the County Council, whereas in the larger boroughs all powers are administered by the same councils. It is not possible for the district councils to have veterinary officials of their own, but when such officers are employed by County Councils, they should arrange to work as much as possible with the local sanitary officials, as only by this means can the true spirit of the legislation be obtained. Under the present regulations this is the only practical method of carrying them out in the counties, but by placing the whole of the control of the milk supply under the County Councils, great efficiency and considerably greater uniformity of control would be achieved. This system has recently been adopted in Scotland.

The veterinary officer should be utilised as much as possible in the inspection of meat, milk, fish, and if necessary of other foods and should give advice on the management of all horses or other animals owned by municipal authorities or on any subject connected with animal hygiene.

Finally, there should be attached to all municipal veterinary departments, a laboratory equipped to deal with the examination of milk samples as well as with the investigation of any pathological conditions met with. This must be under a trained bacteriologist, but whether he should be medical or purely veterinary must be a matter to be decided by circumstances..

There can be no doubt that as time goes on the duties of the municipal veterinary officer, whether he be in the town or in the country, will become more uniform and regularised, and it is to be hoped that further legislation will be brought in at no very distant date to place the veterinary officer in a more satisfactory position.

In Defence of the British Farmer.

" Farmers may be less talkative than many other classes concerning their endeavours to surmount the difficulties with which their industry is beset, but their silence does not mean that they have been inactive," says the Agricultural Correspondent of *The Times*. " The enterprising farmer in the North of Scotland who has ' tried everything on his 160 acres of arable land, except rearing black foxes for their fur,' without being compensated for his trouble, may have exceeded the normal range of effort, but his case, bereft of any possible exaggeration, is typical. There are definite limitations to departure from established methods, fixed by soil and climate, but short of attempted violation of natural decrees, farmers have searched with courage, resource, and discretion to find a way out of their difficulties, often with nothing more than moderate success. While central schemes have been formulated and put in force for investigating their troubles, they have been ceaseless triers themselves in the practical work, and their efforts have been frustrated by depressed markets for whatever article they produce. If prices be fairly liberal when a new or remodelled procedure is attempted, they are low again before home supplies can be presented."

Meat Inspection in England.

By Lt.-Col. T. Dunlop Young, O.B.E., M.R.C.V.S., D.V.S.M., Veterinary Officer and Chief Meat Inspector, Central Markets, Smithfield.

If any person desired to study the history of meat inspection, such as it is, in this country, he would not require to search very far back, and as he gradually proceeded with the study he would become amazed that, in a country where the best of food animals are bred, so much laxity has existed in adopting a uniform and organised system of inspection, carried out, as it is in other countries, by specially-trained veterinarians. It appears from literature—apart from the statement in Ostertag's standard book on the subject that in Rome in the year 388 two inspectors controlled meat markets and shops—that to Scotland, from which our best beef arrives, belongs the honour of first obtaining ordinances to control meat inspection. The following list sets out the countries and/or cities with the dates in which laws, ordinances or regulations were brought into operation to deal with meat inspection: Scotland, 1153, 1192, 1284, 1897; France, 1162, 1350; Italy, 1221; Nordhausen, 1310; Stettin, 1312; Belgium, 1333; Berlin, 1343; Passau, 1394; Wurtemberg, 1605, 1761; Bavaria, 1615; England, 1847, 1875, 1890; City of London, 1851, 1891, 1911. Amiens (France) established public abattoirs in 1350. and Prussia in 1868. Germany appears to have been the first country in which veterinarians made a special study of meat inspection, and veterinary inspectors were first referred to as meat inspectors in 1761.

The City of London, nearly 50 years ago, appointed a veterinarian as meat inspector in their public abattoirs and, ten years later, Professor Walley of the Royal (Dick) Veterinary College, Edinburgh, taught meat inspection. He advocated that veterinary surgeons should be appointed as meat inspectors and published the first book on the subject in the English language. In 1892 Scotland obtained an Act, giving local authorities power to erect public abattoirs and forbidding the use of private slaughter-houses where public abattoirs had been erected. The appointment of veterinary officers as expert meat inspectors was recommended by the " Departmental Committee on Meat Inspection " in 1921, their words being:—

> " In order to give effect to our recommendations, the existing law needs to be amended so as to give to the veterinary officer appointed for purposes of meat inspection, or to a meat inspector who is not a sanitary inspector, the statutory right to enter premises and inspect and seize unsound food, which at present vests only in the medical officer of health or the sanitary inspector or inspector of nuisances."

This refers to the English laws relating to meat inspection, none of which mentions the words veterinary officer; therefore, although a member of the Royal College of Veterinary Surgeons has undergone a long and intensive course of instruction, he is not by law authorised to act as a meat inspector, while a medical officer or sanitary inspector, neither of whom has had the same training in the diseases of animals, is empowered to seize not only diseased meat but even a diseased animal. This state of affairs is amazing to veterinarians all over the world. Even

now there seems to exist, in the minds of some people who ought to know better, an idea that a veterinarian is not a highly-trained professional man, but rather that he is a sort of improved trained farrier. Not very long ago a medical officer said to the writer: "I suppose you veterinarians do get a little training in bacteriology?" He was amazed when he had the reply: "It is at least equal to, if not better than, the training you obtain in the same subject. This opinion has been verified by a prominent member of your profession who has acted as one of our examiners."

It might not be out of place to give here a brief summary of the subjects in which the British veterinary student has to satisfy his examiners. After matriculation he has now to undergo five years' training in chemistry, physics, biology (zoology and botany), animal management, physiology and anatomy of the domesticated animals (*viz.*, horse, ox, dog, sheep, pig, cat and fowl), biochemistry, histology (including systematic hæmatology) and embryology, pharmacology, veterinary hygiene and dietetics and, in the final examination, veterinary pathology (including morbid anatomy), pathological hæmatology, bacteriology, mycology, protozoology, helminthology, entomology, clinical instruction, anæsthetics, principles and practice of veterinary medicine, special therapeutics, meat and milk inspection, principles and practice of veterinary surgery, surgical and applied anatomy, examination for soundness, pathological shoeing, clinical surgery, obstetrics and jurisprudence.

Having obtained his M.R.C.V.S., if he desires to enter a public health service he must obtain a diploma in Veterinary State Medicine (D.V.S.M.); this requires another year's study. The following subjects must be specially studied at an affiliated school, combined with practical training under a public health veterinary officer, *viz.*, veterinary bacteriology, epizootiology, protozoology, hygiene, toxicology, meat, dairy and milk inspection. The examination extends over one week. The following questions set at a recent examination will give readers some idea as to the value of the diploma. In addition to the written examination, the student has to pass practical tests in public health work.

. . . .

Royal College of Veterinary Surgeons: Diploma in Veterinary State Medicine.

Veterinary Hygiene.

Six Questions Only to be Answered.

1. Describe a good method for the disposal of an anthrax-infected carcass of a bullock found in a pasture field. State the precautions you would take to prevent labourers becoming infected and also what you would recommend should be done with the field.
2. State how you would ascertain if the ventilation of a cow-byre is "efficient" or not.
3. Discuss the uses of perchloride of mercury as a disinfectant.
4. Discuss the following foods, paying particular attention to their utility for milch cows:—

   Rice bran. Maize gluten feed (Paisley meal). Wet brewers' grains. Locust beans.

5. How is the nutritive value of a food determined?
6. Give the chemical composition of whey and separated milk and state how these by-products can be used in the feeding of animals.
7. Are there any regulations as to laying down a new drain from a stable to the main sewer, as to size, declination and inspection?
8. Give a list of poisonous grains that may be found included in foods. Describe the appearance of a couple of them and the symptoms they would produce.

. . . .

Bacteriology and Protozoology.

Six Questions Only to be Answered.

1. Describe the morphological and cultural characters of the organism associated with Sporotrichosis in the horse.
2. Describe in detail the procedure you would adopt in order to demonstrate the presence of (1) the bacillus of Blackquarter; (2) Coccidia, in sections to be prepared from fresh tissues containing the respective organisms.
3. Describe the macroscopic and microscopic characters of Johne's disease in the ox. What recommendations would you make for the cultivation of the bacillus of Johne's disease from a fresh lesion?
4. Describe the macroscopic and microscopic characters of Tuberculous Mastitis in the cow. How would you demonstrate the organism in the milk from such a case?
5. Describe fully how you would prepare the materials necessary for carrying out a complement fixation test, and indicate the exact technique you would employ in conducting such a test.
6. Give an account of the properties of the organism responsible for Caseous Lymphadenitis in sheep. Describe the distribution and characters of the lesions of this disease.
7. What do you know of the properties of the virus of Vesicular Stomatitis? Compare them with those of the virus of Foot-and-Mouth disease.
8. Write an account of Bovine Coccidiosis, including a description of the macroscopic and microscopic characters of the lesions of the disease.

. . . .

Epizootiology.

Six Questions Only to be Answered.

1. Summarise the main provisions of the Glanders or Farcy Order at present in force.
2. State what you know with regard to the geographical distribution of Cattle Plague. How may this disease be dealt with in a country where it is widespread among the cattle?
3. Write a short account of the etiology, modes of infection and dissemination, and lesions of sheep pox. How is this disease controlled so far as Great Britain is concerned?
4. Discuss the etiology, modes of infection and dissemination and symptoms of rabies. How may the disease be dealt with (1) in a country recently invaded by it and (2) in a country where it usually exists?
5. Mention the more important ways in which Foot-and-Mouth disease may be introduced into a country, illustrating your answer, where possible, by reference to the experience gained within recent years in connection with outbreaks in Great Britain, Ireland, and the United States of America.
6. Give an account of the etiology, period of incubation, methods of diagnosis and characters of the lesions of Bovine Pleuro-Pneumonia. Explain the methods used to control the disease.
7. What is the present procedure for the control of Swine Fever in this country? Indicate alternative methods that might be adopted, and discuss the relative advantages of each.
8. What are the chief agencies concerned in the dissemination of anthrax infection? How does the bacillus maintain its existence under natural conditions? Indicate the method available for the protection of animals against this disease and discuss their applications.

MEAT INSPECTION, DAIRY AND MILK INSPECTION, ETC.

Six Questions Only to be Answered.

1. State what you know about the following terms in connection with milk :—

Clarifying, preheating, early souring, stringiness and taint.

2. Discuss the steps to be taken to prevent the contamination of milk from the time milking is about to commence to the stage of cooling.

3. Give your opinion of " Clean Milk Competitions " and state how one should be organised.

4. What are the statutory provisions for the sale of " Graded Milk? " What requirements are necessary for selling milk under the various grades?

5. Describe the routine method of inspection of the carcass and viscera of a pig. What are the chief diseases for which pig carcasses are " seized " in slaughter-houses?

6. Explain what is meant by the following terms :—

Black Bleeding, Fevered Flesh, Bone Taint, Cold Butchering, Badly Bled Carcass, " Stripping," and Dropsical Carcass.

Explain how you would recognise these conditions and whether or not you would pass the carcass or part of the carcass as fit for human food.

7. What are the chief parasitic diseases communicable to man from food animals? Describe the routine method of inspection for the detection of these parasites in the food animals.

8. What are the regulations which control the inspection and sale of horse flesh for human food?

. . . .

At present, nearly all important cities, towns and urban districts employ veterinary officers as public health officials in connection with the inspection of meat, cowsheds, and in public abattoirs. The improvement in meat inspection where veterinarians have been appointed is marked, and now useful statistics can be obtained as to the incidence of disease in animals slaughtered for human food.

Doubtless, in due course, the Public Health Acts will be revised, strengthened and brought into line with advanced views on sanitation. When that time arrives we expect veterinarians to have accorded to them the necessary legal authority to carry out duties in connection with the inspection of live stock, meat and milk production, for which their training fits them, and to the benefit of the general public.

A Wonderful Clydesdale.

" One of the most notable animals in Clydesdale history disappears in the death last week of Dunure Footprint at the age of twenty-two years," says the *North British Agriculturist* of July 24th. " This ends the flow of a stream of blood which has more widely dominated the Clydesdale breed than that of any other perhaps in its history. Prince of Wales, Darnley, Baron's Pride, Baron o' Buchlyvie, were all famous in their day, but for prepotency Dunure Footprint will probably stand out as the most arrestingly remarkable Clydesdale stallion of the lot. He was probably more in-bred in his descent than many people have taken the trouble to study, and it may therefore seem all the more remarkable that his constitutional vigour and reproductivity were so wonderful. He has left many colours amongst the Clydesdale of to-day that will not be regarded as either attractive, or probably true to historic Clydesdale breed tradition, but that fact will not detract from his unique reputation as one of the greatest breeding animals known in our time."

Special Article Section.

Arterio-Sclerotic Kidney (Primary Contracted Type) and Secondary Contracted Kidney in the Dog.

By J. R. M. Innes, M.R.C.V.S., Institute of Animal Pathology, Cambridge University.

The study of organic disease of the kidney has always presented considerable difficulty to the human clinician and pathologist since little is known of the causes responsible for the great variety of structural alterations of the kidney seen after death in cases of nephritis. While much work has been done in connection with pathogenesis and classification of nephritis in man, little has been attempted by the comparative pathologist. M'Fadyean (1929) has recently drawn attention to the lack of knowledge of nephritis in animals, but the literature on this subject is meagre. Much light might be thrown upon the many problems associated with nephritis if a more detailed knowledge of this disease in animals existed.

Organic kidney disease in domestic animals is usually classified in the manner adopted in human pathology, and is based principally on structural alteration of the different tissue elements. We have, therefore, lesions which affect primarily : (1) the glomeruli ; (2) the tubules ; (3) the interstitial tissue and (4) a type of lesion associated with vascular changes in the kidney. It is with this last type that this paper is principally concerned.

It has to be remembered that these different elements are so intimately dependent upon each other that injury of one is certain to have some effect on the others and that in cases of nephritis *post-mortem* appearance of the kidney represents but one stage in the anatomical development of a complicated lesion. It is thus often difficult to determine the origin of the lesion, although usually traces are left which show the path by which the organ had reached the stage when death occurred.

It was first pointed out by Gull and Sutton (1872) that sclerotic changes in the arteries of the kidney in the human being were responsible for certain forms of kidney disease. This was supported by Jores and Pym (1904), later by Gaskell (1912) and others, and it is now generally accepted that these arterio-sclerotic changes are the cause and not the incidental result of such kidney lesions. The organ in these cases is of the scarred and contracted type. This characteristic type is now classified under the general heading of primary renal cirrhosis or fibrosis and includes (*a*) primary contracted kidney (the genuine Schrumpfniere of the German writers) and (*b*) senile arterio-sclerotic kidney. In primary contracted kidney, the capsule is thickened and adherent, the cortex is atrophied and the walls of the arteries are much thickened, particularly in the boundary zone, and fibrosis is prominent. The general view is that the lesion is secondary to the arterio-sclerotic changes in the kidney and is part of a general change of the same type in the small arteries of the brain and other parts of the body, the aorta, however, seldom being involved. This type is further characterised by cardiac hypertrophy and high blood pressure. This is in contrast to senile arterio-sclerotic kidney where there is little or no cardiac hypertrophy and no

increase of blood pressure, but a generalised sclerosis of the large arterial trunks. The microscopic picture is comparable to that observed in primary contracted kidney, the glomerular changes being difficult to distinguish and fibrosis being just as prominent. The principal diagnostic feature, according to Jores, is that in the primary contracted type there is observed a considerable thickening of the smallest arteries accompanied by fatty changes; both types are due to atrophy following inefficiency of the circulation through diseased arteries and subsequent fibrosis. The difference lies in the fact that in primary contracted kidney the main circulation is efficient, and therefore arterial obstruction needs to be complete to cause glomerular necrosis since the glomerular circulation is maintained to the last moment by the high blood pressure (Gaskell 1912).

This primary contracted type differs but little in gross appearance from that of the so-called secondary contracted kidney which is an end result of a protracted glomerulo- or tubulo-nephritis (parenchymatous nephritis). Any injury to either the glomeruli or tubules will result in the replacement of these damaged structures by connective tissue with ultimate scar production. It is thus seen that in diffuse inflammatory conditions affecting principally these structures, if recovery does not take place, the end result will be a much scarred and contracted kidney, this stage being reached by a different process from the primary type where sclerosed kidney arteries, with consequent inefficient blood supply, cause tissue malnutrition.

Such differential classification has not been undertaken in animal pathology, and as will be seen later, the existence of a true primary contracted type is in doubt. M'Fadyean (1929), has discussed and compared certain forms of nephritis observed in the domestic animals, and has described cases seen in the dog from which he concludes that changes similar to, if not identical with, those observed in primary contracted kidney in man are found, but without the arterial alterations which are believed to be the causal factor in man. The main changes which M'Fadyean observed are summarised as follows: Abnormally small kidneys without any capsular thickening, atrophy of the cortex, replacement of the destroyed renal tissue by abundant connective tissue proliferation (particular emphasis being made of the fibrosis being more prominent in the boundary zone and medulla than in the cortex), cystic dilatation of the collecting tubules; and further emphasis being laid on the absence of arterio-sclerotic lesions in the arteries of the boundary zone and medulla. He also quotes Hutyra and Marek, who are evidently of the opinion that the ocurrence of nephritis in animals corresponding to primary contracted kidney in man is unproven, as in the former the association of sclerosis in the renal arterioles has not been observed.

The following cases from two dogs seemed worthy of record, from the fact that in one (case 1), arterio-sclerotic changes, as mentioned above as causing primary contracted kidney in man, dominated the microscopical picture and made it apparent that the lesion is one which is regarded as of rare occurrence in animals.

The other, although presenting some similarity, showed no such arterial lesion and serves as a comparison.

Case 1.—The animal was a fox-terrier bitch, nine years old, which had been destroyed on account of ill-health without any definite clinical diagnosis. Unfortunately, only the kidneys were available for examination. These were small, with thickened adherent capsules; the kidney surface was rough and granular, and mesial section showed a very atrophied cortex and pale medulla.

Microscopical Appearances.—The outstanding feature was the extreme sclerosis of the arteries in the boundary zone and cortex with much calcification, accompanied by abundant proliferation of connective tissue, particularly evident in the boundary zone. This latter appeared as a thick band of fibrous tissue demarcating a much atrophied cortex from the medulla (Fig. 1). The fibrous tissue, which was sparsely nucleated, consisted of thick interlacing bundles of collagen fibres, embedded in which were scattered atrophic renal structures. The arteries were also thickened and calcified, and only in places did this fibrosis invade and reach the surface of the cortex. Thus there were narrow areas of cortex showing much fibrosis alternating with wider parts where there was comparatively less structural alteration and little or no fibrosis. The medulla showed a fair amount of fibrosis, particularly near the region of the renal papilla and there was conspicuous cystic dilatation of the collecting tubules. These dilated tubules were irregular in size and shape, and lined by tall columnar epithelium, but extensive desquamation had occurred and the lumina in nearly all cases contained a large amount of cell débris.

Examination of the arterial lesions showed the change to be more apparent in the arteries of the boundary zone. Extension of the sclerosis into the arteries of the cortex corresponded to narrow areas in which fibrous proliferation had advanced from the boundary zone. Serial sections demonstrated this to be the case. Hypertrophy of the tunica media was pronounced in the large arteries in the boundary zone, calcium deposits being incrustated along the internal elastic laminæ and intimal changes were not prominent. Intimal calcification was very pronounced, however, if the change was traced into the small afferent arteries, and in some the lumina were seen to be obliterated. It was evident that there was an extensive arterial degeneration. The extension of the sclerotic process into the afferent arteries had occurred very irregularly, so that the resultant focal atrophy had the distribution of infarcts. The renal structures in the cortex related to the affected afferent arterioles and in association with much fibrous proliferation, showed distinct and different changes from the alternating parts where there was not much fibrosis or sclerosis and are described seperately.

In the areas of the kidney cortex involved in the advancing fibrotic process from the boundary zone, the glomeruli could be distinguished as such but were necrotic and the renal tubules belonging to these glomeruli were small and atrophic. The glomeruli stained very diffusely, differential structure was lost, the capsule was collapsed and only the nuclear fragments of the tuft were left (Fig. 4). It appeared to be a process of coagulative necrosis, while calcification of these degenerated renal structures was not observed; a lymphocytic infiltration was prominent around such necrotic and semi-necrotic structures. The sclerotic changes had evidently followed sudden obliteration of the blood supply. The small arteries from the boundary zone which evidently supplied these structures, were markedly sclerotic and the lumina of some were obliterated. Connective tissue fibres ramified around and between all these structures to the surface of the cortex.

The areas alternated, as mentioned, with parts where

there was comparatively less structural alteration, and where there had been little or no invasion of fibrous tissue from the boundary zone, while arterio-sclerotic lesions were not nearly so marked. The main difference appeared to lie in the glomerular changes, and may be explained along the lines that complete obliteration of the blood supply to these structures had not occurred, the afferent arteries in these areas being less affected, so that the changes were rather of a chronic nature (malnutrition), than of a sudden tissue death. The glomeruli showed various stages of an ischæmic atrophy from commencing to complete degeneration. The earliest stage appeared as a hyaline thickening of the capsular basement membrane, particularly at the pole opposite the hilum, followed by calcification which involved the loss of the capsular epithelium (Fig. 3). In the commencing stages the tuft structure was clear and distinct, the capillaries showed patent lumina and contained blood. In glomeruli showing further stages of capsular thickening and calcification, tuft atrophy was pronounced, the structure being shrunken and hyaline in appearance. In such the capsule had not collapsed, probably owing to its solid nature. Sclerotic changes were not marked in the afferent arterioles supplying these structures. The process was of an ischæmic nature in contrast to the changes described previously, where obliteration of the blood supply had evidenly occurred. A prominent feature was the abs nce of any inflammatory change in the glomeruli. The tubules showed swelling of the lining epithelium, shrinkage from the basement membrane and desquamation. An outstanding feature, however, was an extensive and peculiar calcification of the basement membrane occurring so as to appear to pencil the outline of the tubules in the miscroscopical picture (Fig. 2). In these areas there was no marked cell infiltration.

The important changes in the medulla have been described, the greatest being the cystic dilation of the tubules.

Fat was demonstrated in frozen sections in the walls of the sclerotic arteries, in the fibrotic parts in fair amounts, and in some of the atrophied glomeruli.

The calcified structures stained purplish-black with hæmotoxylin, intense black with silver nitrate even after previous immersion in oxalic acid, pink with purpurin, and gave no reaction for iron either by the Prussian blue or Turnbull's blue test.

It is unfortunate that an analysis of the urine was not possible, and that other organs were not available for examination, as it would have been of interest to compare the changes which are features in the differential diagnosis of primary contracted kidney and senile arterio-sclerotic kidney in man. It is apparent, however, from the histological evidence that the arterio-sclerotic changes are the most prominent feature of this lesion, and are clearly correlated to the focal fibrotic atrophy. This suggests that the lesion should be classified as a true primary renal fibrosis.

Case 2.—This animal was a six-year-old spaniel which had died after an acute attack of gastritis; only the kidneys were available for examination. These organs were small and contracted, the capsule was thickened and slightly adherent. The surface was much pitted and scarred, reddish gray in colour, and on mesial section the cortex was uniformly narrowed, the inner limit being definitely marked; the medulla was pale and the arteries were not prominent. In appearance it differed little from the kidney from case 1.

Microscopical Appearances.—Examination of the organs showed both to be affected to the same extent. Under a low magnification the much atrophied cortex was seen to be separated from the medulla by a distinct broad band of fibrous tissue composed of thick bundles of collagen fibres sparsely nucleated; a diffused invasion of the cortex had occurred. Little of the normal structure of the cortex remained, the glomeruli had for the most part been destroyed and their associated tubules were atrophic, these degenerated structures being embedded in a ramifying fibrous tissue (Fig. 5). A few glomeruli and associated tubules showed hypertrophy apparently of a compensatory nature. The tuft structure of the glomeruli were normal and the capsular epithelium intact, but the basement membrane appeared thickened. In some cases the associated tubules were much dilated, the epithelium being thin and cubical, and the lumina contained colloid casts.

In those parts of the cortex where much damage to the parenchyma had occurred various stages of glomerular degeneration could be traced. The commencing stage appeared as a thickening of the capsular basement membrane and adhesions between capsule and tuft. In the more advanced stage the glomeruli showed obliteration of the lumina of the tuft capillaries, collapse of the capsule, and finally, in what appears to be the ultimate stage, a homogeneous necrotic mass staining but faintly with eosin, showing only the remains of a few nuclei. The associated tubules were atrophic and much fibrosis had occurred around and between these structures. A small round-cell infiltration was prominent in such areas.

The arteries in the cortex and boundary zone were well defined, but no trace of a sclerotic change was observed.

The medulla showed a fair amount of interstitial increase, but the striking feature was the cystic dilatation of the collecting tubules mentioned in connection with case 1, and stressed by M'Fadyean as a feature in the cases described by him. Extensive desquamation of the epithelium lining these dilated tubules had occurred.

The renal artery and its main branches showed no evidence of sclerosis, the intima was intact and the media was not hypertrophied.

Frozen sections treated with appropriate stains demonstrated fat in the degenerating tubules and glomeruli, but not in any of the arteries.

These changes, although showing some similarity to the lesion in case 1, present several striking differences, the chief being the absence of sclerotic changes in the arteries. It is suggested that this lesion, in contrast to that observed in case 1, is probably the end result of an acute parenchymatous nephritis and therefore can be classified as a secondary contracted kidney.

It certainly appears that this lesion and others, apparently similar, which have been described by veterinary authors should be classified with the secondary contracted type rather than be compared with the primary contracted kidney in man when such a characteristic feature as arterio-sclerotic lesions is absent.

Figures.

Fig. 1.—Case 1. x8¼. Hæmotoxylin and eosin. Arterio-sclerotic kidney. Note atrophied cortex (on the left) demarcated from medulla by broad band of fibrous tissue; trabeculæ of fibrous tissue pentrating to the surface of the cortex (B); area with comparatively little fibrosis, different type of structural alteration (A); much hypertrophied

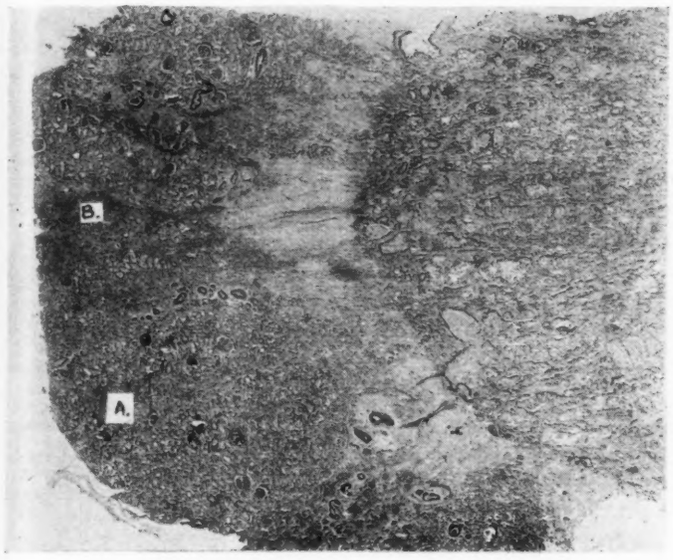


Fig. 1.

and calcified arteries in boundary zone; and cystic dilatation of tubules in medulla.

Fig. 2.—Case 1. x60. Silver nitrate and safranin. (Calcium deposits black). Note peculiar calcification of basement membranes of the convoluted tubules; a glomerulus with calcified capsule; sclerotic vessels in upper half of figure showing much calcification.

Fig. 3.—Case 1. x200. Hæmotoxlyin and eosin. A glomerulus taken from area A, fig. 1, *i.e.*, from area with little fibrosis. Commencing stage of ischæmic atrophy. Note the tuft capillaries with patent lumina; a hyaline thickening of afferent arteriole (C); thickening and calcification of capsule with loss of capsular epithelium.

Fig. 4.—Case 1. x200. Hæmotoxylin and eosin. Taken from area B., fig. 1, *i.e.*, area in which there is extensive sclerosis of arteries and much fibrosis. Compare necrotic appearance of glomeruli (D & E) with the glomerulus in figure 3. Note abundant fibrous tissue; cross sections of arterioles in top half of figure showing sclerosis, calcification, and obliteration of lumen. (F).

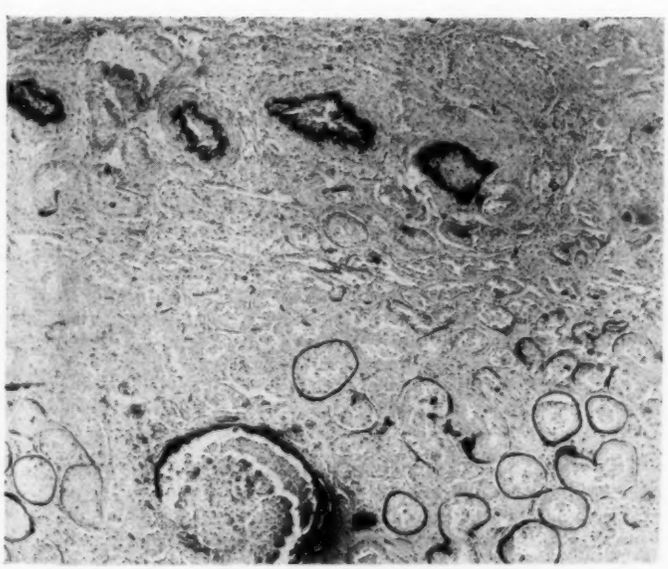


Fig. 2.

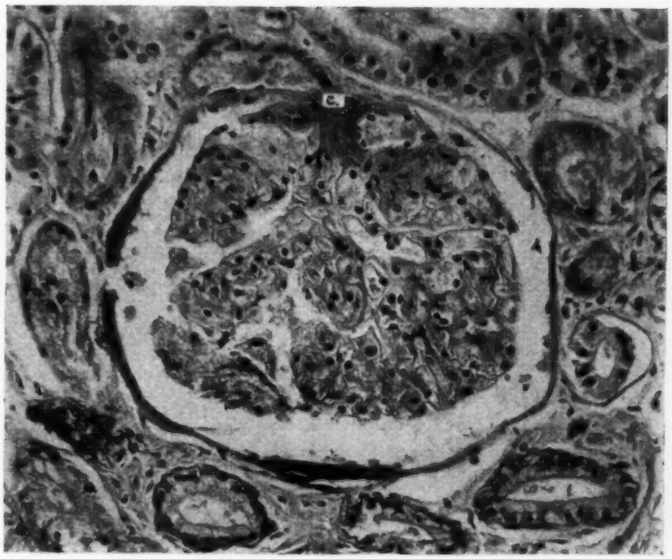


Fig. 3.

Fig. 5.—Case 2. x12. Hæmotoxylin eosin. Kidney. Note the uniformly atrophied cortex on the left, demarcated by a broad band of fibrous tissue; diffuse fibrosis of cortex; cystic dilatation of tubules in medulla with much desquamation; absence of sclerotic changes in arteries.

Fig. 6.—Case 2. x70. Hæmotoxylin and eosin. Area from cortex, the kidney capsule being on the left. Note in the lower half of the figure a glomerulus in an early stage of degeneration, with slight thickening of capsule and slight tuft atrophy; the associated tubules do not show severe change; fibrosis is not marked: In the upper half of the figure a glomerulus in an advanced stage of degeneration, tubules are atrophic; extensive fibrosis; cell infiltration prominent.

References.

Gull & Sutton (1872). *B.M.J.* Vol. 1, pp. 680.

Gaskell (1912). *J. Path & Bact.* XVI 287.

Jores & Pym (1904). Virchow's Archiv. Bd. CLXX viii. 367.

M'Fadyean (1929). *J. Comp. Path.*, Sept. 1929. p. 141.

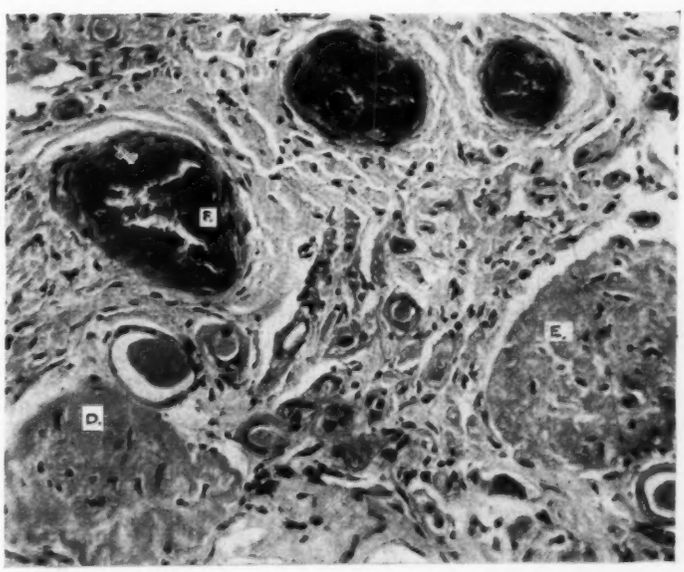


Fig. 4.

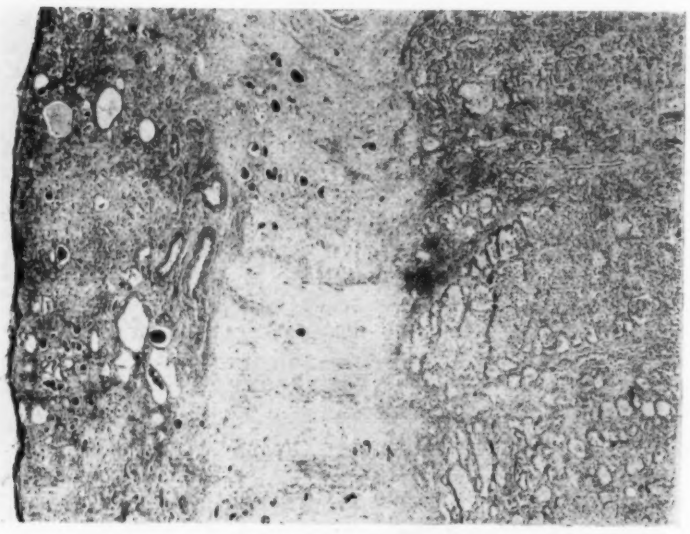


Fig. 5.

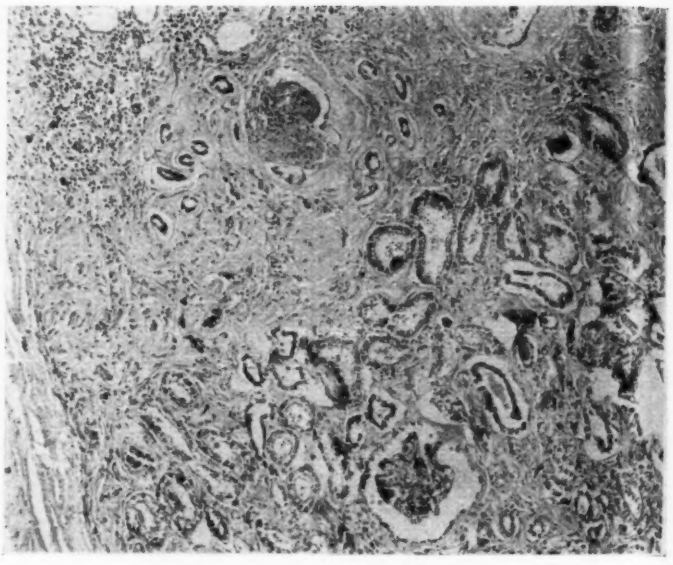


Fig. 6.

Eradication of Tuberculosis.

The Highland and Agricultural Society and the N.V.M.A. (Scottish Branch) Scheme.

At a general meeting of members of the Highland and Agricultural Society held on July 23rd, the attitude of the Society directors towards the scheme of the Scottish Branch of the National Veterinary Medical Association for the eradication of tuberculosis in cattle gave rise to some discussion. The subject was raised by Mr. A. W. Montgomerie, Lessnessock, Ochiltree, who expressed disappointment that the scheme should have been turned down by the directors.

The Duke of Buccleuch interpolated with the remark that while it was not competent to submit a motion, discussion on the subject was opportune in the interests of the Society and of agriculture generally.

Mr. Montgomerie said that the subject of tuberculosis deeply concerned all stock breeders. Everyone would be very disappointed if this country, the most famous stock-breeding country in the world, should lose that great name. If they did not start now and clean up their herds, that was the position it would get into. The scheme which had been proposed by the Scottish Branch of the National Veterinary Medical Association was practically the same as that proposed by the conference on agricultural policy which was brought forward five or six years ago. After that conference the Ayrshire Cattle Herd Book Society circularised all the members of Parliament and tried to push the scheme through. Some questions were asked in the House of Commons by various members, and they were told that this was a big question, and was worthy of a special commission to go into the matter. So far as the speaker was aware, nothing had been done, and the past five years had been lost.

An Immediate Necessity.

He disagreed entirely with the statements put forward by the Society against the carrying out of the scheme. It was very necessary that a scheme should be carried out, because herds which were being cleaned for two or three years were more susceptible to the disease. Anyone starting this work at the present time had a stiff row to hoe. They had to start off with employing veterinary surgeons in order to have the herds tested. They had to pay for that, and if they had so many reactors they had to pay for two or three months and then once a year. After that they tried to sell the milk as T.T. milk, and they had to pay for a licence to sell it. One would naturally think, the speaker added, that a man who tried to clean up a herd for the benefit of the country would get some subsidy in doing so, but the position was exactly the reverse.

An International Question.

The medical profession was putting up a big fight, and, as far as one could gather, they were having great success in eradicating tuberculosis from the human subject. Were stock breeders going to look on and do nothing?

The United States, which took a great number of cattle from this country, now stated that they would only take cattle from tuberculin-tested herds. That meant that other countries were going to clean up their herds, and in this country they would be left in time. Canada at the present time took animals from herds that were not tuberculin-tested, but in time that country would be compelled to take cattle from tuberculin-tested herds. It had been stated that there had not been great progress made in the matter, but now they had thousands of gallons of milk produced from tuberculin-tested herds. He concluded by asking the directors of the Society to reconsider the matter, and asserted that the attitude which they had taken up looked to him as if they "had lost the old Highland spirit to conquer."

The Society's Attitude.

Colonel Houldsworth, Kirkbride, Maybole, supporting Mr. Montgomerie, said he understood that the scheme was turned down by the Science Committee and was not discussed by the directors. He felt that if they were to receive a deputation from the Veterinary Association and from one or two of the breed societies interested they might be prepared to withdraw their opposition to the scheme.

Mr. W. C. Hunter, Glenfarg, said that as chairman, temporarily, of the Science Committee, it should not be assumed that the committee had not given very careful consideration to the so-called scheme. They had discussed it at very considerable length, and he thought it said a good deal for the reasonableness of their decision that members of the board, at a large meeting, unanimously agreed to homologate their finding. So far as the eradication of tuberculosis was desirable, Mr. Montgomerie was preaching to the converted. To his (the speaker's) mind the scheme had yet to be framed. An important part of it was in Article 20, which stated that "the Ministry would require to make regulations to guard against risk of infection from imported stock which might be necessary for particular areas." When they knew what those regulations might be they would then be able to consider the scheme, which, in his opinion, had not yet been evolved at all.

Scotland's Lead.

The Hon. Godfrey Corbett, Rowallan, Kilmarnock, congratulated the Highland Society on providing separate accommodation this year for tuberculin-tested cattle at the show, thus showing the way to the Royal Agricultural Society of England which had found it impossible to do so.

Mr. J. E. Kerr, of Harviestoun, pointed out that the directors would be glad to receive a deputation from the Veterinary Association or from other bodies interested.

Sheep Diseases.

By H. G. Bowes, F.R.C.V.S., Headingley.

In a short article on such an extensive subject as sheep diseases it is impossible to do more than to touch briefly on a few diseases which are the cause of the more serious losses to which the sheep farmer is subject in this country.

Before considering individual diseases it is necessary to emphasise the fact that sheep diseases generally have not, until recent years at any rate, received so much attention as the diseases of other farm animals.

The reason for this is fairly obvious: owing to the comparatively small value of the individual sheep, the farmer philosophically accepts the loss of a few as inevitable and buries them without any further effort to ascertain the cause of death. It is only when deaths are occurring in large numbers that he considers it worth while incurring the cost of professional advice.

There has, therefore, been comparatively little opportunity for the veterinary practitioner to exercise his skill in the treatment of many of these diseases. For the same reason his opportunities for the furthering of his knowledge of them by clinical experience have been somewhat limited.

This is especially to be regretted, as the sheep is one of the most profitable of farm animals and the annual total loss to the sheep farmer and to the country generally from sheep diseases is enormous. Much of this loss might be prevented, and nothing would contribute more to this end than careful research into the nature and cause of some of these obscure diseases. In fact, especially during the past ten years, much valuable work has been done in this direction at the various Animal Disease Research Institutes in England and Scotland, but there still remains much to be done.

It should be noted that not only are the losses by death from some of these diseases heavy, but in many cases an even greater loss is sustained by loss of condition and consequent delay in marketing animals which are being fed for slaughter.

It is most important that the sheep farmer should realise that many of these diseases are to a certain extent preventable, and that, therefore, much of the loss which he regards as inevitable may be avoided by the adoption of proper precautions.

Parasitic Diseases.

Parasitic diseases are many, and are the cause of constant and heavy losses amongst sheep.

Parasitic Gastritis or Scour.—Amongst the more serious of these losses are those due to infection of the digestive system with Strongyle worms, which cause wasting and diarrhœa, and, in severe cases, death. Several varieties of these worms are generally found in infected sheep, and their presence is likely to be unsuspected owing to their minuteness and consequent difficulty in detecting them in the contents of the fourth stomach and intestines when a *post-mortem* examination is made. Losses from these parasites are usually heaviest in lambs in the late summer, but also occur in older sheep and ewes. The loss of condition in an infected herd is probably more serious than the loss from actual deaths. This disease is much more widespread than is generally appreciated.

Treatment by the administration of copper sulphate solution, if adopted before the wasting is pronounced, is usually very effective.

Husk or Parasitic Bronchitis.—In certain seasons this disease is the cause of serious losses amongst sheep on some farms. The disease is due to the presence in the bronchial tubes of the lungs of small thread-like worms (*Strongylus filaria*) which cause irritation to the mucous membrane. There is great loss of condition, accompanied by paroxysms of coughing.

Another lung parasite, the *Strongylus rufescens*, is also very common in sheep, but this causes lesions in the lung itself. It is very widespread in this country and is not generally held to be the cause of much serious illness amongst sheep. It is probable, however, that losses from pneumonia due to infection with this parasite are not by any means uncommon.

Sheep Nostril Fly.—This has not been regarded as a very serious cause of loss amongst sheep in this country, but an outbreak of an interesting, but I hope unusual, nature was brought to my notice this spring which suggests that it may be more common than has been suspected. A number of sheep were affected on a farm on the Yorkshire Wolds and several died. The sheep were showing brain symptoms, the more severely affected being comatose. On *post-mortem* examination larvæ of the sheep nostril fly (*Œstrus ovis*) were found in the nasal chambers, and in several cases one or more small abscesses were found on the surface of the brain on the anterior part of the cerebrum.

The probable explanation was that minute newly- hatched larvæ had migrated from the nostrils to the cranial cavity, probably through the cribriform plate of the Ethmoid bone, had then perished and given rise to pus formation.

Liver Fluke.—This disease is very widespread and varies in its incidence according to the nature of the land and climatic conditions. It is always more prevalent in a winter following a wet summer, and, of course, especially on wet swampy land. It is not by any means confined to low lying pastures, but is quite common on moorland grazing where there are often boggy patches. Experiments in the treatment of this disease by the administration of extract of male fern or of carbon tetrachloride, particularly those carried out in North Wales by Montgomerie, have shown that the disease can be successfully controlled if it is taken in time. On many farms where the disease regularly occurs sheep are now being dosed systematically in the late autumn with the object of destroying the flukes before they had time to cause serious wasting. This treatment has meet with considerable success. Experiments in North Wales have also shown that the small fresh water snail (*Limnæa truncatula*), which is the intermediate host of the liver fluke, may be killed on the land by spraying with a weak solution of copper sulphate. This may in some cases be successfully used a second line of attack on the parasite.

Other parasitic diseases which are common in the sheep of this country, but to which space will only permit me to refer briefly, are sturdy, due to the *Cœnurus cerebralis*, the cystic stage of one of the dog's tape-worms; and the sheep tape-worm *Moniezia expansa*. The latter is very common and is responsible for some loss of condition, particularly in lambs, but is not such a serious cause of wasting as the strongyle infection of the digestive system

already referred to. Incidentally, I have found that the copper sulphate treatment for strongyle infection is also very effective in causing the discharge of tape-worms.

Diseases Associated with Lambing.

Very heavy losses occur in some seasons amongst lambing ewes, these losses being due to a variety of causes.

One of the most serious troubles met with in the North of England is a disease locally known as "Tremblings" or "Moss Illness." It is not to be confused with louping-ill, which is also known in certain districts as "Tremblings."

At present little is known as to the nature or cause of the disease, but an investigation into it is being carried out by Professor Gaiger, of the Liverpool Veterinary Research Institute. The disease occurs in lambing ewes, usually within a few weeks of lambing, either before or after lambing, and the mortality is high, especially in those ewes which are affected before lambing. The symptoms are unsteady gait, nodding of the head and trembling of the lips and fore limbs; later the ewe goes down and becomes unconscious, death supervening very often in a few hours, but it may be several days.

Up to the present the most successful treatment has been inflation of the udder, as for milk fever in cows. In those cases of the disease in ewes which have already lambed, this treatment is generally successful, but in the case of ewes affected before lambing some difficulty is experienced in inflating the udder, unless an extremely fine teat tube is used with the inflation instrument; consequently, the treatment has not generally been so successful in these cases.

During the past lambing season this disease was very prevalent in the moorland farms of Yorkshire—the losses in some cases being very heavy, as many as 30 or 40 deaths occurring on one farm. Treatment by the subcutaneous injection of a solution of calcium gluconate was tried in some cases with a certain degree of success. Some temporary improvement generally followed the injection but there was frequently a relapse and unless the dose was repeated the relapse often proved fatal. Some cases which recovered required two or three doses. The dose used was 40 c.c. of a 10 per cent. solution of calcium gluconate and it is possible that a larger dose might advantageously be given.

Septic Metritis is often the cause of very heavy losses in lambing ewes. Many farmers do not fully appreciate the infectious nature of the disease and the importance of complete isolation of cases, with the result that the infection spreads rapidly, often being carried from infected to healthy ewes by the shepherd attending them. It is of the greatest importance that not only should affected ewes be isolated, but that a separate attendant should be provided for them.

Lamb Dysentery.—This disease is the most serious one affecting young lambs. It generally occurs in lambs in the first few days of life and is very fatal. It is a form of scour in which the dung is frequently tinged with blood. *Post-mortem* examination often shows ulceration of the intestines. It is very prevalent in the North of England, and in the Craven district of Yorkshire it is known locally as "Ray." In a bad season the losses on some farms may be as high as 30 or 40 per cent. of the lambs born.

The disease has been the subject of research for some years, notably by Gaiger and Dalling at the Scottish Animal Diseases Research Institute, and later by Dalling at the Wellcome Research Laboratories. Dalling believes the cause to be a virulent type of *Bac. welchii* and has introduced a serum for immunising lambs against the disease. This serum has been used in the Craven district in the past two lambing seasons with the greatest success, both in the prevention and treatment of the disease.

Braxy occurs to some extent in England, chiefly in the moorland districts, more especially of the North of England. In Yorkshire it is known locally as "Blackwater." No doubt there may also be some confusion between it and "Blackquarter," which is the cause of losses amongst sheep as well as young cattle on some farms.

Dietetic and Deficiency Diseases.

Owing to the wide differences in the feeding of sheep, some being fed almost entirely on moorland grazing, others, as on the Yorkshire Wolds, for a considerable part of the year almost solely on roots, it is not surprising that many sheep should suffer from digestive troubles and probably also from deficiency diseases due to a mineral or other deficiency in their diet. There is, therefore, scope for much useful research in this connection. The work at the Rowett Institute, Aberdeen, in the analysis of various sheep pastures has shown that in some cases the grazing is very deficient in certain necessary minerals.

As a preliminary to a small mineral feeding experiment which was conducted in a hilly district of Yorkshire last winter, analyses of the grasses were first made and some of the moorland grazing was found to be particularly deficient in minerals.

Finally, much loss is suffered from foot rot and also from necrotic sores on the legs, due to infection through abrasions in the skin by the *Bac. necrophorus*. This disease is known in Scotland as "Orf," but it is also quite common in England, especially on heavy land, though it is not generally known under that name in England. Careful supervision of sheep and early treatment by walking them through a foot bath of copper sulphate solution, or other suitable treatment, will greatly reduce the incidence of both these diseases.

In conclusion, I would suggest that there is still a large field for research in connection with sheep diseases. I would also point out the importance of educating the farmer as to the nature and cause of such diseases as may be regarded as preventable, in order that he may take such steps as may be possible to prevent them and so reduce his losses from them.

A Directory of "Quacks."

Americans seeking medical advice are warned first to consult the directory of 'quacks" compiled by the National Better Business Bureau and the New York Department of Health, in which are set down the names and histories of 25,000 medical charlatans, says the New York correspondent of the *Daily Telegraph*.

This new "rogues' gallery of medicine" is hailed by Dr. Shirley Wynne, Health Commissioner of New York, as one of the most important strides made in the drive to rid the city of the "human vultures who prey on well and ill alike, and who are rightly regarded as one of the most dangerous of all health menaces." The advent of radio, over which they are permitted to broadcast, has helped the "quacks" to thrive greatly in recent years, until their activities have now become really dangerous to the health of the community.

With these "camp followers of the march of science" catalogued and the names of their tonics, patent medicines, and cures on the file, "quackery," it is believed, has been dealt a severe blow.

Pig Diseases.

By G. Mayall, M.R.C.V.S., Bolton.

Swine Fever.

It seems to me that many modern treatises on disease commence at the wrong end—in this connection something may be said in favour of the Chinese book which is read backwards—for on many occasions it is proclaimed by scientists that this is an age of preventive medicine, but when one reads accounts of disease one finds elaborate descriptions of history, causes, symptoms, pathology and therapy and then at the end about three or four platitudinous lines about prevention.

It is nearly 100 years ago since swine fever was first noticed and described, and since then investigation has been intense and profuse and has been going on in many countries. Despite the efforts and expense it cannot be recorded that much progress has been made against this disease. Other maladies, such as rabies, small pox, glanders, yellow fever, rinderpest, pleuro-pneumonia, and bubonic plague, have been stamped out or reduced to a minimum by eternal vigilance and sanitary regulations, but swine fever, influenza (animal and human), catarrh, measles, whooping cough and rheumatism still go merrily on. There is a slum problem in connection with animal disease as well as that in the human domain. In many cases the veterinary scientist knows when circumstances are dead against him in tackling a disease and in other instances, when he sees good conditions and surroundings, hope of a successful issue springs eternal in his breast. He knows, too, where disease may be expected to arise, and where its origin may occasion some surprise. Hygiene is still the goddess to whom we should bow down, and whose aid should be sought, in the eradication of disease. Has she had sufficient homage paid to her in connection with swine fever? Or is it possible to give her sufficient attention in this connection?

There is an old tale of a farmer who went to a picture exhibition and saw a painting of some Wessex saddlebacks feeding at a trough. He listened to the exclamations of delight from the bystanders at the excellence of the picture and then he said: "It ain't true to Nature, 'cause the pigs ain't got their feet int' trough." These fœces-spreadable diseases, of which perhaps swine fever, bacillary white diarrhœa, and tuberculosis are the best examples, do occasion the contemplator furiously to think. What are the conditions, where pigs are born and reared on the premises, under which it may be fairly assumed that swine fever should not arise?

Shortly, the following should be observed:—

1. Ensure daily cleanliness of sty and food receptacles. Sties should be well drained, with impervious floors and these kept as dry as possible.

2. Cleansable and impervious feeding and drinking troughs, and so constructed that the feet cannot be introduced.

3. Roomy, dry and airy sleeping quarters without draughts, pigs sleeping on platforms raised from the floor.

4. A good supply of fresh, clean, drinking water, especially in summer.

5. Clean, but not unrestricted, grazing land free from dead animal refuse, or water contamination and with no running water through it.

6. Clean food supply. Avoidance of putrid, animal or vegetable material. Meal of the best quality, free from adulteration, mould or sourness. Receptacle for preparing food to be frequently cleansed.

7. Dairy products should be boiled before giving to the pigs.

8. Garbage best avoided altogether.

9. Destruction of rats and mice.

When Pigs are Bought.

New purchases should be isolated for at least four weeks and their state of health carefully watched.

The Union of German Pig Breeders recommend that a *young pig* should be kept in a boarded-off compartment in the same sty as newly-bought pigs and if it remains healthy at the end of four weeks it is safe to mix the old with the new stock.

I have nothing to write about swine fever itself. Its signs, incidence and prevalence have been described and discussed *ad nauseam*. Good hygiene, strict and intelligent supervision over the health of pigs, and immediate anchoring and destruction of the ailing and carrier pig are the best things that can be done in our present state of knowledge. Will science ever advance beyond this? Is not good hygiene our best safeguard, and the point that ought to be stressed all over the country in connection with animal matters?

Swine Erysipelas.

The symptoms of this disease are well known. There is a mild form from which pigs recover, especially if aided by suitable electuaries, and there is a deadly form which kills quickly and soon takes off fat pigs.

Inasmuch as the bacilli of this disease are frequently found in the soil of badly-drained hollows and dells, and we have frequently noted cases on marshy, sunken or undrained land, it is wise that pigs should be kept off such places.

Swine erysipelas serum has been used with some success in a number of outbreaks. It is not advisable to inoculate pigs on clean premises. This disease sometimes assumes a highly infectious form and the treatment with serum may considerably reduce the number of losses. Years ago Sir Stewart Stockman, in a lecture at Shrewsbury, said: "It must be remembered that the majority of pig premises do not lend themselves to adequate disinfection." The statement is still true to-day and again the question of animal slums and disregard of hygiene comes into prominence.

Skin Diseases.

The two skin diseases that I have seen in the pig are *mange* and *ringworm*. In mange the head, base of the ears and the areas around the eyes are usually the places badly affected. The disease is communicable to man, ox and goat. The detection of the parasite, intense itching, and the large area of skin affected will differentiate this disease from eczema. Ringworm, due to *trichophyton tonsurans*, may occur and spread rapidly in pigs. In both these cases of skin disease early isolation of affected animals is desirable. The litter should be burnt and the sty and surroundings cleansed and disinfected and frequently limewashed, special attention being paid to woodwork. As

treatment, dressing the skin with a mixture of oil and sulphur to which a little oil of tar and paraffin have been added, generally suffices. Sometimes after the first dressing it helps to remove scabs and scales if the animal is washed down with a warm solution of carbonate of soda.

Giving Medicine to Pigs.

The best way to give medicine to pigs is by means of electuaries or powders mixed in sloppy tasty food. The old way by a rope in the mouth and a boot with the toe cut off looks bad and is not satisfactory. In the October issue of *The Veterinary Journal* for 1924 Mr. Norman Bisset, M.R.C.V.S., describes a method of treatment of verminous bronchitis in the pig by the intra-nasal injection of 1 c.c. of chloroform down each nostril. Three treatments at fours days' interevals were effective.

Since this article by Mr. Bissett, Vajda, of Budapest, writing in *Tierärzthiche Rundschau,* 1928, No. 70, pp. 367-370, describes a method of giving fluid medicine through the nose in swine. An assistant, sitting down, holds the pig fixed between his knees; with the left hand he holds the fore feet and with the right presses the jaws firmly together. With the cone of a record syringe pressed firmly into the nostrils, the edge pushed down on the snout, the author injects up to 10 c.c. of fluid medicine. After each injection the mouth is let free for a few seconds. In this way he injected 30 c.c. in about 15 seconds. The pig is held for about 10 seconds after the last injection so that the fluid flows down the œsophagus. He has injected over 2,000 swine by this method, but the remedy used was worm medicine (Kebal) in castor oil and only in a few cases watery solutions, and further tests need conducting with these latter before general adoption in practice.

Tuberculous Lesions Portrayal Exhibit.

"Artists, mechanics, and veterinarians of the U.S. Department of Agriculture have collaborated in developing an exhibit which, by an unusual optical effect, portrays the effects of tuberculosis on cattle, swine, and poultry. The spectator first sees what appears to be almost life-sized photographs of a cow, a hog, and a chicken. Then, to the astonishment of observers, the exhibit assumes an entirely different appearance. Automatic "flashers" turn off the lights in front and turn on lights in the rear of the panel. The observer then views, as though by X-ray, the internal organs of the animals and is able to note tuberculous conditions in the form of nodules and other lesions on vital organs.

"The display has been one of the features of interest at recent tuberculosis conferences in Cedar Rapids, Iowa, and Albany, N.Y. This unusual exhibit was planned by Dr. Elmer Lash, of the department's Tuberculosis Eradication Division, in consultation with R. S. Allen, exhibit specialist, and J. H. Stevenson, chief illustrator of the department. The mechanical features were made in the department shops. The Bureau of Animal Industry has not been able to meet the numerous requests for the loan of this exhibit, but it points out that the construction is relatively simple, requiring only photographs of the proper size and simple electrical wiring."—*Veterinary Medicine.*

The Shire Horse.

By T. Eaton Jones,, F.R.C.V.S., Chief Veterinary Officer, City of Liverpool.

In view of the keen competition between horse and motor transport, a short article on "The Shire Horse" seems to be appropriate.

The breed originated as the Old English Cart Horse about the middle of the eighteenth century, the earliest record being of the Packington Blind Horse about the year 1760, as mentioned in the first volume of the Stud Book of the English Cart Horse Society, the title of which has since been changed to that of the Shire Horse Society.

The alteration of the name from "Cart Horse" to the "Shire" is understood to be due to the fact that most of the English heavy cart horses were, at that time, bred in the shires lying between the rivers Humber and Cam.

Compared with the Old English Cart Horse, the present day heavy cart horse is undoubtedly a vastly different animal; and the Shire Horse Society, and breeders and owners of studs, are to be highly congratulated on the enormous improvement which has taken place, particularly during the present century.

In the latter part of last century a large number of our Shire animals were prone to be bred on coarser lines than at present; and although conformation in the way of general outline and weight has not altered very greatly, there were many characteristics which have been largely eliminated and have become the exception rather than the rule.

By this one means that flat feet with fleshy heels, round bone, carrying coarse hair and subject to grease, hind-legs sickle-shaped, and drooping quarters, with short, round hocks, have been replaced by animals full of class and quality, with hard flinty feet, plenty of depth and width of heel, flat bone carrying not too much straight, silky hair, elastic sloping pasterns, well arched, deep ribs with well-developed loins, long quarters, the tail well set up to the top of the back, and the hind legs rather inclined to the straight than the sickle, with long, flat, wide hocks.

It is to this type of animal that one looks to keep the breed permanently before the haulage contractor; and, in the opinion of a daily increasing majority, if this is done, the Shire will always maintain its position in the world of traction, and there is little doubt that, so far as short journey haulage goes, he will compare on extremely favourable terms with any other method of haulage existing at the present time.

There is now a feeling abroad that during the next few years, with so many small owners not having continued breeding, there will be great difficulty in supplying the demands of horse owners; but one must hope that the demand will stimulate the supply, and that this extremely profitable side of agriculture will be permanently revived.

Comparisons, although odious, are made daily showing how difficult it is to maintain motor haulage on a satisfactory basis at anything under a straight run of five miles. On the other hand, any mileage up to, and within, this radius is very adaptable for any experienced owner of the right class of heavy cart horse.

In many towns, however, sufficient advantage is not taken of the enormous power of the Shire horse, and much

loss is entailed through the lack of knowledge of his capabilities.

In the Northern towns he appears to be better understood than in the Midlands and South.

From Liverpool, which tradition has associated with the heaviest class of horse haulage in the world, much might be learned by horse owners regarding the power of the cart horse, and an observer stationed along the dock roads would see weights varying from four to five, and even seven, tons being comfortably drawn by one horse on a lorry weighing from thirty to forty hundred-weights, and loads varying from a seven to ten and even more tons on a lorry weighing from two to two-and-a-half tons being comfortably and easily moved by a team of two horses.

For this to be done, however, experience, and the best horses and horsemanship, are required.

To the uninitiated, the work as here outlined would appear arduous and excessive, and inexperienced persons and others having no knowledge of horse work, and only acquainted by hearsay and their own opinion, would acclaim it cruel and harsh treatment.

The condition of the animals, and their life at the work, prove otherwise, however, and demonstrate how easily the real cart horse can perform his task.

It must not be imagined that any horse is fit for this job. The animal used must be the right type of Shire, which has been broken in as a two-year-old and worked on the farm until between four and five years of age, or, better still, until fully five; then brought into town in hard condition (by which is understood no superfluous flesh), and fed on natural food conducive to growth and maturity.

Such animals, when fed in proportion to the work they perform, thrive, grow all round, and perhaps, after some slight attack of "town stable fever," maintain a healthy condition for the rest of their working existence, most of them averaging eight years' work.

These animals should not be confused with the show horse, which may never have a collar over its head, and whose condition is comparable to that of the fat boy of Pickwick, who, no doubt, would have collapsed in a similar manner if put to work equal to that, say, of a dock labourer.

It would be well to state of what one may call a "pampered" horse that, however good in conformation such an animal may be, if he has not been accustomed to work until nearly five years of age, if he has just been got ready for sale and to enable him to draw a practically empty cart or waggon, and fed to become big without condition, in a very short time the owner will have a debilited, worn-out looking animal, and unless speedy remedial measures are taken, a total wreck will result.

For maintenance of health, horsemanship generally is required, and the good owner takes care that the driver is a horseman and can drive a cart horse, which is no easy task; that the animal is shod to suit the pavement upon which he works; and that the stabling and feeding are all that can be desired.

Statistics taken from a large stud show that the average mileage, with all delays taken into consideration, was 14 miles per horse per day; but this could be considerably increased, with the elimination of delays, without unduly affecting the well-being of the horse.

Finally, in confirmation of the weights indicated above, it may be remembered that in February, 1924, two Shire geldings, at the Shire Horse Society's Show at the Agricultural Hall, Isliagton, London, pulled, with comparative ease, a load totalling in all eighteen-and-a-half tons on granite setts.

Clinical Section.

Diverticula of the Small Intestine in the Horse.

By J. R. Rider, M.R.C.V.S., Darlington.

Introductory.

During the past six years, in the course of routine *post-mortem* examinations of ponies from a stud of 1,500 mine animals, hypertrophy of the wall of the small intestine has been observed thirteen times. On three of these occasions multiple diverticula have been detected.

So far as is known, only one instance of multiple intestinal diverticula has been recorded in veterinary literature, by Gill[2], in 1929, who observed the condition in the sheep, in New Zealand.

Numerous references to the condition in man are available in medical literature. Spriggs and Marxer[4] give a bibliography extending to sixty-five earlier publications. These authors state that diverticula of the alimentary canal were detected 143 times in 1,000 consecutive X-ray examinations. Of these, 41 patients had diverticula either of the duodenum or the jejunum, or of both regions concurrently. Figures based on *post-mortem* findings in pit ponies suggest an incidence of only three per 1,000 deaths, but if Iceland ponies only are considered, one finds an incidence equivalent to 28 per 1,000 animals employed. Diverticula of the small intestine of the horse have not been observed in the dissecting room, Bradley[1].

The observations in the present series of cases conform closely to the findings recorded in medical literature. They have occurred in adult animals, the average age being eight years, but as male animals only are employed it has not been possible to consider the condition in the female.

Spriggs and Marxer[4] use the term *diverticulosis* to embrace all phases of the disease; they recognise a *prediverticular* state in the colon, in which radiological examination discloses a pathological condition, before diverticula are detected, and a later stage, termed *diverticulitis*, in which there has occurred inflammation of the pouch, and later, hypertrophic change in the intestinal wall.

Hypertrophic change has been a constant feature in the pit pony, but in one case (No. 1,254) a lesion was observed, in a non-diverticular part of the jejunum, which was suggestive of the prediverticular state described by Spriggs[3].

Diverticula of the Small Intestine.

Diverticula may be detected in any part of the small intestine, but more commonly in the duodenum and jejunum. In pony No. 1,254, 225 pouches were counted, of which 215 were found in the jejunum, and the remaining

ten in the duodenum. They usually occur along the mesenteric border of the intestine, and, being extra-peritoneal, they may be missed unless a careful search is made. They have also been observed in other situations, sometimes having only a covering of peritoneum. Usually death has been due to rupture of such a pouch.

Diverticula are herniæ of the mucous membrane through the muscular coats of the bowel wall. They vary considerably in size, the average being about as large as a hazel nut. Small pouches may be less than a pea, while the largest one yet observed measured 50 mm. long, 60 mm. wide, and 45 mm. deep. It was distinctly bi-lobed, and had caused separation and rupture of the mesenteric layers This pouch occurred in the jejunum, about two metres posterior to the pylorus. Dissection of a medium-sized pouch revealed a well-defined ring, having a smooth border, in the muscular coats. The mucous membrane was extruded through this ring, where a neck-like constriction occurred, and then became mushroom-shaped where it lay between the mesenteric layers. The lining of the pouch was arranged in folds near the neck. Food particles were found in the pouch.

A characteristic and constant change has been the thickness of the bowel wall. The greatest measurement has been about 20 mm., but a thickness of 10 mm. has been common. The hypertrophy affects both mucous and muscular coats, the latter being principally involved. The mucous membrane is arranged in transverse folds, many of them being quite deep. The mouths of small diverticula, which may appear as small slits, are found in the depressions, and may be covered by a neighbouring fold.

In some of the earlier cases, in which diverticula escaped detection, the degree of stenosis was such that one experienced difficulty in introducing a pencil. Stricture of the bowel, with preceding dilatation, has also been seen.

These cases have been included with the later ones, in which diverticula were detected because :—

1.—The clinical picture was identical.

2.—The other *post-mortem* changes were in agreement.

3.—The observations of Spriggs and Marxer[1] indicate that hypertrophic change, with loss of elasticity and rigidity of the bowel wall, are late changes in the course of the disease.

Pony No. 1,254 presented numerous circumscribed congested areas, in a non-diverticular part of the terminal jejunum. Removal of the mucous membrane over these areas disclosed corresponding areas in the circular muscle, with separation of the muscle fibres. Further dissection completely removed the congested area, no trace of which could be found on the serous coat. Section through a congested area shewed it to have a conical outline, the base, about 10 mm. diameter, lying in the mucous membrane, and the apex of the cone terminating in the muscular coats.

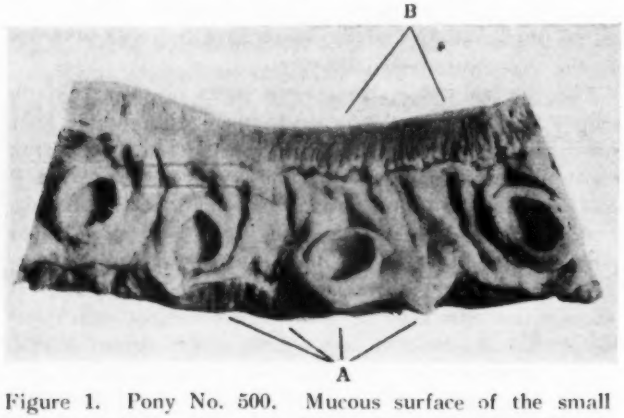


Figure 1. Pony No. 500. Mucous surface of the small intestine, illustrating :—A. Divercula artificially dilated. B. The great thickness of the bowel wall.

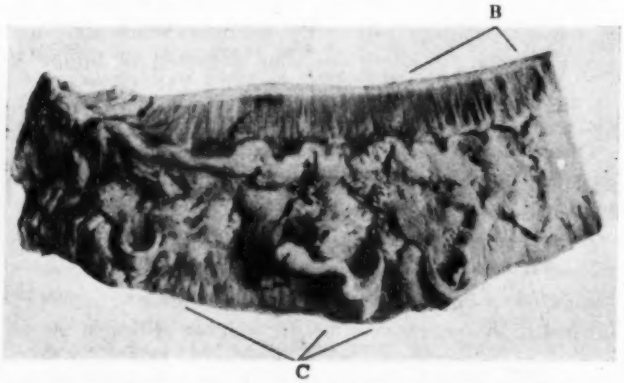


Figure 2. Mucous surface of another piece of small intestine from the same animal illustrating :—
B. The thickness of the bowel wall.
C. Small diverticula.

Histology of the Lesions.

The considerable thickening of the bowel wall is seen to be due mainly to proliferation of fibrous tissue, and round cell formation in varying extent would seem to indicate the presence of some infectious process. The mesenteric lymph glands shew in the early stages round

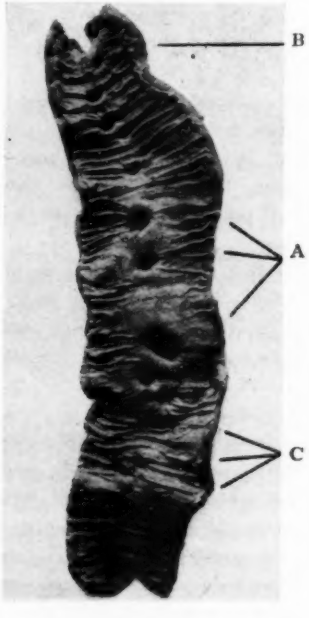


Figure 3. Pony No. 1254. Mucous surface of small intestine illustrating transverse folds :—
A. Diverticula artificially dilated.
B. The thickness of the bowel wall.
C. Small Diverticula.
Note the folding of the membrane lining the pouches.

cell formation similar to that seen in the thickened bowel wall, and in the later stages a varying degree of destruction of gland tissue is observed.

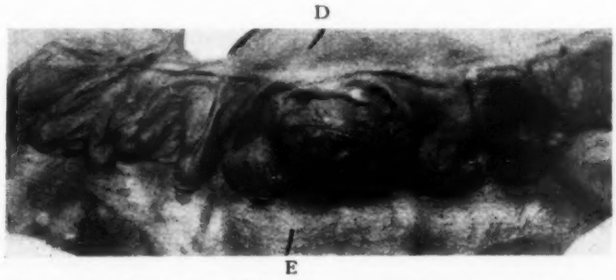


Figure 4. Pony No. 1254. Serous surface of small intestine with mesentery attached, illustrating the position of the artificially dilated diverticula.
D. Mesentery.
E. Bowel wall.

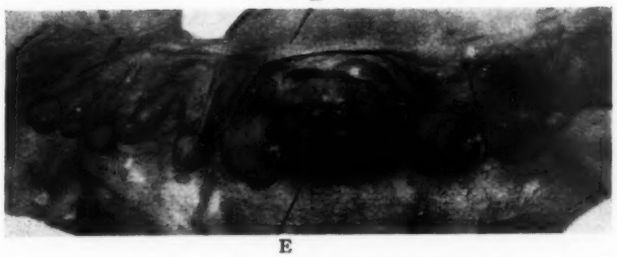


Figure 5. The same as figure 4, except that the diverticula have been outlined
D. Mesentery.
E. Bowel wall.

Etiology.

The etiology of the condition is not yet finally settled. By some authorities it is held that most of the pouches are congenital in origin. Several arguments in favour of this view are recorded in medical literature, notably the following :—

In man it has been said that there is often no evidence of inflammation, dilatation, or hypertrophy of the adjacent bowel. That most of the duodenal pouches occur in the inner, concave aspect of the horse-shoe-shaped duodenum, which is supported by the pancreas, and should, therefore, be less liable to extrusion from weakness of the wall than the convex aspect. Further, the development of pancreas and liver, as outgrowths from this part of the embryonic gut, suggests that other outgrowths are not improbable[4].

The alternative view, favoured by Spriggs and Marxer[3, 4, 5], is that pathological change, of an inflammatory or degenerative nature, occurs in those parts of the bowel wall in which, later, diverticula will be detected. They confine this opinion to diverticula of the colon, and term the antecedent pathological change the *pre-diverticular state.*

The finding of areas of congestion in the jejunum in the present series is suggestive that a pre-diverticular state may occur in the small intestine of the horse. Other *post-mortem* findings, already described, also suggest that inflammatory process has been active, and tends to support the view that diverticula are acquired rather than congenital in origin.

It may be that some pouches are congenital in origin, and the relative frequency of the condition in Iceland ponies, as compared with the rarity in other breeds, may be regarded as evidence in support of the congenital theory. In the absence of information regarding the incidence of diverticula in breeding animals in Iceland, it is impossible to do more than speculate whether an hereditary factor has any influence on the manifestation of the disease. It does, however, seem improbable that one animal should have upwards of two hundred congenital defects in the musculature of the jejunum, and yet survive to adult life.

Gill[2] mentions the association of stomach and intestinal parasites with his case in the sheep. Parasites have not been seen, either constantly or in large numbers, in the present series, and examination of fæces for parasitic ova has usually yieided negative results.

A bacterial infection has been considered, by medical workers, as a possible cause of the prediverticular state, but further experiments are necessary before definite conclusion can be stated[5].

Once formed, the pouch may be gradually distended by the recurring rises of intra-intestinal pressure, coincident with the passage of food.

Animals Affected.

Eleven of the cases have occurred in imported Iceland ponies, giving an incidence, as stated, equivalent to 28 per 1,000. The age at death has varied from 4 to 14 years, with an average of 8 years.

They have worked for a period ranging from nine months to eight years, with an average of 3¼ years.

Symptoms.

The common history is that, after some weeks, or months, in the pit, the animal is reported as being unthrifty, and a poor feeder. Examination then reveals that muscular development is retarded, the appetite is capricious, and mastication is slow and lacking in vigour. The coat may be harsh and staring, increased borborygmi may be observed, and there may be some small degree of constipation. Rarely, a history of periodic abdominal pain can be obtained. Examination of fæces for parasites, or their ova, yields only indefinite results. If parasites are found the appropriate treatment does not give beneficial results.

Later one sees a slow and progressive wasting of muscles, and a pendulous abdomen may become prominent.

The pony may continue in this condition for an indefinite period, which is terminated by acute abdominal pain, and death due to perforation of some part of the small intestine. Quite often the perforation has been seen in the duodenum in the region of the right kidney.

Alternatively, the wasting may progress until the pony is unfit for work, and the condition is terminated by destruction.

Diarrhœa has only once been observed, in the terminal stages of the disease.

Diagnosis.

Since radiological examination is impracticable in mine animals, diagnosis can be neither accurate nor conclusive. After exclusion of other common causes of debility, sus-

picion that the condition exists may be aroused by the history obtainable, and the progressive wasting, not referable to common causes.

Rectal examination may detect a thickened portion of small intestine, which will confirm the suspicion, but a negative rectal examination is of little value.

Treatment.

None of the more usual methods of treating debility has proved of service. Some animals, in which sclerostomes were suspected as being responsible for the condition, received appropriate treatment, without benefit. Others were given long courses of iodine, and still others were allowed prolonged periods at pasture.

Pasture gave the most encouraging results, but in every case the resumption of work in the pit was followed by a recurrence of symptoms, and the familiar cachexia.

Case Records.

No.	Breed.	Age at Death.	Service.	History and Post-mortem Lesions.
		Years.		
93	Iceland	8	3, 4/12	No previous history. *Post-mortem.*—Hypertrophy and stenosis of duodenum, perforation of jejunum.
146	Iceland	8	3, 8/12	Destroyed on account of injury. History of periodic colic, and cachexia. *Post-mortem.*—Hypertrophy and stenosis of jejunum and ileum. Not suspected during life.
320	Iceland	7	3, 9/12	Capricious appetite, and debility. *Post-mortem.*—Total length of small intestine thickened and indurated. Corrugation of mucous membrane. Perforation of duodenum.
481	Iceland	6	1, 6/12	Chronic debility after one year in the pit. Destroyed. *Post-mortem.*—Hypertrophy and stenosis of small intestine, except the first and second parts of the duodenum.
548	Welsh	4	9/12	Chronic debility, treated for sclerostomiasis, without improvement. Rectal examination detected thickened intestine. Destroyed. *Post-mortem.*—First 20-ft. of small intestine appeared normal, followed by progressive hypertrophy and stenosis to ileo-cæcal valve. Cæcum shewed "Pimply Gut." Other organs appeared normal, but anæmic.
489	Iceland	6	1, 6/12	Constipation after period at pasture. Died. *Post-mortem.*—Hypertrophy of small intestine, fatty degeneration of liver.
484	Welsh	8	4	Fatal colic, without previous history. *Post-mortem.*—Perforation duodenum. Slight hypertrophy of wall, inflammation of ileo-cæcal valve and base of cæcum.
280	Iceland	10	4, 9/12	Died without previous history. *Post-mortem.*—Perforation, with hypertrophy and stenosis of duodenum.
670	Iceland	10	2, 7/12	Usual history of debility in pit. Fæces examination negative. Prolonged course of iodine without result. Destroyed. *Post-mortem.*—Hypertrophy and stenosis of whole length of small intestine.
309	Iceland	14	8, 3/12	General health good for first four years in pit, afterwards cachectic. Terminated by acute colic. *Post-mortem.*—Perforation with hypertrophy and stenosis of small intestine.
500	Iceland	10	5, 10/12	Always debilitated and listless. Died. *Post-mortem.* — Enormous hypertrophy and stenosis of terminal duodenum and jejunum. Wall of bowel at least ½-inch thick. Numerous vesicles on serous coat. Section shewed many diverticula in bowel wall, some of them extending to the serous coat.
1,188	Iceland	8	1, 5/12	General health good when sent to work. Afterwards progressive debility. No improvement after course of iodine. Seventeen months after beginning work rectal examination detected thickened intestine. Destroyed. *Post-mortem.* — Several areas of small intestine shewed thickened wall, followed by more normal gut. Strictures were seen. No macroscopic diverticula

No.	Breed.	Age at Service. Death. Years.		History and Post-mortem Lesions.
				were found, but a section of jejunum shewed a separation of the circular muscle, with commencing extrusion of the mucous membrane.
1,254	Iceland	7	1, 4/12	General health good when sent to work. After six months began to shew symptoms of debility, which at the end of 12 months aroused suspicion that hypertrophy of bowel was present. Acute diarrhœa and death. *Post-mortem.*—225 diverticula found in duodenum and jejunum shewed circumscribed congested areas. Mesenteric lymph glands enlarged and hæmorrhagic. Hæmatomata found in mesenteric layers near ileo-cæcal valve.

Summary.

A chronic debility, not referable to common causes, has been observed in mine animals, and found to be associated with hypertrophic change in the wall of the small intestine, and the presence of diverticula.

The condition, which is associated with indefinite symptoms in its early stages, occurs in adult life, and may be in existence for long periods before terminating in death or destruction.

The incidence of the disease, though more frequent in Iceland ponies, is low, but improved technique may show it to be more common that is at present believed.

The macroscopic, and microscopic appearances of the diverticula, and other *post-mortem* lesions are described.

The etiological theories are considered, and the suggestion made that the formation of diverticula may be preceded by pathological changes in the muscular coats of the intestinal wall, a suggestion which supports the more recent medical etiological theory.

The symptoms, diagnosis, and treatment are discussed, and records of thirteen cases, with photographs of affected bowels, are appended.

Finally, I desire to express my thanks to Major G. W. Dunkin, M.R.C.V.S., D.V.H., for undertaking the histological examination of the tissues, and for much useful assistance, to Mr. J. E. Barnard, F.R.S., Mr. Welch, of the National Institute for Medical Research, and to Mr. S. T. Briggs, M.P.S., for the photographs.

References.

1 Bradley, O. Charnock.—1930. Private Communication.

2 Gill, Dudley, A.—1929. *Veterinary Record.* IX., 638.

3 Spriggs, E. I.—1929. *B.M.J.* II., 569.

4 Spriggs, E. I., Marxer, O. A.—1925, *Quart. Jnl. Med.* XIX., No. 73.

5 Spriggs, E. I., Marxer, O. A.—1926, *B.M.J.*, I., 130.

False, or Interstitial, Inguinal Hernia in the New-Born Foal.

By E. Brayley Reynolds, O.B.E., M.R.C.V.S., Newmarket.

False inguinal hernia is the term used to describe a hernia in the inguinal region in which the hernial contents are not confined in the tunica vaginalis. The rupture in the abdominal wall, however, through which it occurs, is situated so closely in front of the internal abdominal ring that the protruded viscus passes down the inguinal canal and may descend sufficiently far to reach the scrotum. Such a hernia, in reality, is a ventral hernia; it is only its position and the similarity, in some measure, of its appearance that has given rise to its appellation. It corresponds with the ventral type in its method of formation, namely, that there has been a solution of continuity of some part of the abdominal wall, through which accidentally-formed opening part of the abdominal contents protrude—this as compared with protrusion through a naturally-occurring opening, as in the case of true inguinal hernia, in which the protruded viscus has passed through the internal abdominal ring. The cause in the majority of cases of both false and true inguinal hernia is the same, a great increase in intra-abdominal pressure; although in the latter type an especially large or relaxed internal abdominal ring, allowing of the ready passage of some part of the abdominal contents, may alone be the cause.

The increase in the pressure in the posterior abdominal region necessary to produce these herniæ is most likely to be brought about by undue traction being hastily applied in order to affect delivery of a normally-presented foal before proper dilatation of the passage has occurred. Delivery should be by propulsion where possible.

A factor determining the position of the rupturing of the abdominal wall in the case of false inguinal hernia is that there is a naturally-occurring anatomically weak point situated just in front of the internal abdominal ring. Inguinal hernia may occur accidentally in the adult entire, but its existence in the newly-born foal is more or less common. False inguinal hernia, however, in the writer's experience, is extremely rare in the latter, the probable explanation being that if for any reason there is a great increase of pressure in the posterior region of the abdomen, relief by way of the comparatively relaxed internal abdominal ring in the foal is more likely than by rupturing of the abdominal wall in front of the ring. In the adult horse if rupturing of the abdominal wall in this region does occur, it more frequently does so nearer the flank than the internal abdominal ring.

It has been customary to advise that a radical operation for the relief of false inguinal hernia in the adult should only be undertaken when all other methods have failed. In the foal taxis *per rectum* is impossible, and further, on account of the generally weak and relaxed condition of the tissues in the newly-born foal, especially in the inguinal region, aggravated by the animal's struggles and efforts to get on its legs, an interstitial hernia soon assumes such proportions that the risk of strangulation of its contents becomes imminent and surgical interference, under less satisfactory conditions, imperative.

A point worthy of consideration is the legal liability of the veterinary surgeon when undertaking the operation.

Without doubt the operation is simplified considerably if the testicle on the affected side is removed; and besides, this procedure may determine its success. Circumstances, however, may be such that it is impossible to get in touch with the owner in order to obtain his permission for this to be done. It may be that the dam of an affected foal is at a stud away from its owner's place; and it may be imperative for the operation to be performed at night when it is impossible to communicate with the owner. This actually happened in the first of the two cases to be described. What, in fact, is the legal position? It has been held in regard to human practice that the first and principal concern of the surgeon is the saving of life; any step, therefore, necessary to this end is justifiable.

The following two cases occurred on the same stud. The affected foals were in no way closely related to one another. The first occurred four years ago and the animal concerned has been raced with only moderate success during the last three seasons; the second occurred last year.

The foal, a thoroughbred, was born at 7 a.m. A swelling in the inguinal region about the size of a child's head was noticed immediately after birth. The foal later in the day showed signs of abdominal pain and when standing was continually straining; a dose of castor oil and an anodyne were administered. The foal was first seen by the writer at 9 p.m. It was showing signs of acute abdominal pain and when on the ground endeavoured to keep on its back. There was a tense painful swelling, somewhat larger than a man's head, in the left inguinal region. When the foal was on its legs this swelling extended subcutaneously down to the inner aspect of the stifle joint; the over-lying skin in this region was œdematous with beads of serum exuding from its surface. Folds of the distended small intestine could be made out immediately under the skin. Interstitial inguinal hernia was diagnosed, and an immediate operation decided upon as the only means of saving the foal's life. The foal was secured by a slightly modified form of Donald's method for securing a horse for a big operation so as to leave the inguinal region free and not crossed by ropes as in Miles' method. Chloroform was administered, starting with one dram, about one ounce in all being used; anæsthesia was profound and readily maintained, and gave no cause for anxiety, it being well born by the foal. This corresponds with the writer's experience when employing this anæsthetic in young foals.

An incision through the skin, immediately over the inguinal region and following the direction of the line of junction of the thigh and abdomen, exposed a large mass of small intestine. The folds of this were considerably distended with gas and the bowel itself was markedly congested, being about the colour of polished light mahogany. Digital exploration established the presence of the testicle with its tunic intact, and a small tear through the abdominal wall immediately in front of the internal abdominal ring. The prolapsed bowel was replaced by manipulating one end only of it close to the hernial opening with the index fingers alternately, endeavouring at the same time to prevent any further extrusion of the other end of the already prolapsed portion. More or less indiscriminate compression of the prolapsed portion as a whole leads to much loss of time, and very little satisfactory progress, besides tending to unnecessary bruising of an already inflamed bowel. Complete reduction was fairly readily accomplished in the manner described. It then became necessary to decide what to do with the testicle and its covering tunics, which were more or less free in the hernial cavity. As it had not been possible to obtain the permission of the owner to take what steps seemed best, it was considered inadvisable to remove the testicle. On the other hand, owing to the very large cavity that had been formed and the already œdematous condition of the skin, it was thought that severe suppuration was almost bound to occur and that this might lead to serious interference with the testicle, if not to peritonitis, by way of its sheath. It was decided to place the testicle out of harm's way by returning it and its tunics to the abdomen through the internal abdominal ring. This was done and three interrupted strong silk sutures were placed across from Poupart's ligament through both sides of the hernial opening and tied. The hernial cavity was cleansed of all blood clot and mopped dry and the skin wound closed by closely placed interrupted sutures, care being taken to express all air from the hernial cavity before and while tying the last suture.

Beyond painting the whole of the inguinal region with tincture of iodine before operating and the skin wound after suturing, only aseptic precautions were adopted. In spite of what had been considered to be unfavourable conditions, recovery was practically uneventful and was complete in fourteen days. Slight suppuration of the skin wound occurred when it was opened with a director between two sutures to allow the escape of some accumulated exudate on the second day; the remainder of the skin wound healed by first intention and the sutures were removed on the seventh day.

The second case was also in a thoroughbred foal, born at 1.30 a.m. A similar swelling was noticed in the left inguinal region. The foal was seen by the writer shortly after birth. Examination determined that the hernial contents were external to the tunica vaginalis, but well confined to the scrotum, and as the foal exhibited no pain an immediate operation was not considered necessary. About 9 a.m. some degree of œdema of the scrotum was apparent and an operation was decided upon. It was carried out similarly to that already mentioned, with the exception that the testicle was removed. The owner's permission to take any steps that might be thought advisable had been obtained. The testicle was removed, ligation of the spermatic artery only being carried out and the remains of the cord returned to the abdomen; the tunics were ligatured close to the abdominal ring and the free portion removed. Suturing across Poupart's ligament through both sides of the hernial opening was carried out as in the previous case and the external wound dealt with similarly. Although the conditions appeared more favourable in this case there was slightly more suppuration in connection with the skin wound. This was controlled, however, by treating the wound with BIPP and recovery was complete in a fortnight. It may be remarked that, although strong plaited silk was used for the deep sutures, no after trouble with them was experienced in either case.

Conclusions.—Immediate radical operation for false inguinal hernia in the new-born foal is indicated, and, provided every care is taken, severe suppuration is not likely to occur, and a favourable result may be expected.

The new-born foal is a good subject for chloroform anæsthesia.

Some Disturbances of the Circulatory System in Cattle.

By F. T. Harvey, F.R.C.V.S., St. Columb.

1.—The Right Heart and Venous Pressure.
2.—Thrombosis and Embolism.
3.—Traumatic Aneurisms.
4.—Spring Œdema of the Head.

The Right Heart and Venous Pressure.

It is very curious that apart from the traumatic forms of heart disease, so little attention should have been given by clinicians to disturbances of the circulatory system in cattle. It is not only in organic or structural disease of the system itself in which symptoms are shown, but in many general and local diseases indications of cardiac failure are comparatively common, and the typical form of its expression, and one easily observed, is the general rise in the venous pressure; in other words, the blood tends to accumulate in the great veins, and there is impaired venous return because of right heart failure. Thus progressive over-filling of the proximal parts of the venous system results from the heart's incapacity to convey the whole quantity of affluent blood from the venous into the arterial side of the vascular system. A law of circulatory correlation has been formulated as between the two sides of the heart somewhat as follows: " In equal and increasing feebleness of the whole heart muscle the patient suffers most and dies from the failure of the right side of the heart only. In other words, the left heart does not receive more blood than the right heart is able to transmit, and the more the right suffers and fails the safer the left heart becomes, but the tissues generally will be suffering from a deficient supply of oxygen."[1]

From a comparative standpoint we may obtain more practical information from a study of the venous system in cattle than in any of the other domestic animals. An over-filled venous system in a cow as shown by large hard jugulars, or milk veins, is always of bad omen. (On three occasions within two years I have felt a pulse in the latter veins, but have found no mention of such in the literature.) The commonest cause of death in acute cases of parasitic bronchitis of young cattle is engorgement of the great veins and distension of the right heart, and this also occurs in association with many conditions in cattle, particularly in milking cows and in the so-called " Thumps " in young pigs. There is often difficult breathing, and it is the blood pump and not the air pump that is defective. Physiologists have divided animals into those with large hearts (hare and wild duck) and those with small hearts (rabbit and hen), according to their vital capacity, or into the athletic and non-athletic[2]. It would seem under modern conditions of high feeding, high milk production, close housing, etc., involving a heavy all-round metabolic increase, that cattle will tend to become increasingly small-hearted in the physiological sense, and this will react towards failure of the right heart in disease and all that it involves. Has not a similar tendency already shown itself in the equine world? The race-horse retains the characteristics of the large-hearted animal and possesses a high vital capacity, while the Shire horse under modern conditions of breeding tends towards its opposite state, or a lowering of " vital capacity."

. . . . .

Thrombosis of the Jugular Vein and Pulmonary Embolism in a Cow.

A cow five or six years old, apparently well when housed on the evening of March 21st, was found ill the following morning and appeared to have had a very disturbed night. The milk yield was down and her appearance very dejected. She seemed better in a few hours, but coughed occasionally. I saw her at 11 a.m. She was standing with her nose to the wind and, in the words of the owner, appeared to be " drinking in air," otherwise there was nothing much to note. A walk of about 50 yards to the byre caused obvious distress in breathing. The cow was slightly lame in the right fore limb. Temperature 102° F., pulse 80. resp. 40. The cardiac impulse was increased, but the heart sounds were little altered. There was an increase of both bronchial and vesicular murmurs, otherwise the lungs seemed normal. The right jugular vein was quite hard and rope-like and obviously full of clotted blood or thrombosed. At the lower end of the furrow it was distinctly globular. There was no wound or swelling of the tissues around the vein, but the latter was rather painful to the touch. There was general venous engorgement. It was thought a danger existed of pulmonary embolism, but in the light of the subsequent history of the case this appears actually to have occurred on the night of the 20th, and was the cause of the sudden severe illness. During the following four days the cow took some food but her course was downward. There was marked venous engorgement, slight œdema of the brisket, laboured action of the heart, and commencing exhaustion with decubitis. She was then destroyed. *Post-mortem* revealed the right branch of the pulmonary artery completely blocked, subsequent thrombus formation having reached the right ventricle and distally into the lung. There was no pneumonia nor any apparent infection or softening of the clot in any of the vessels, and the cause of the condition could not be discovered.

Discussion.—Observed cases of pulmonary embolism in animals are very rare. Käppal, quoted by Hutyra and Marek, appears to have met with the condition mostly in old horses and associated it with thrombotic veins in the posterior extremities, and in the sheath.

A cow was delivered of an emphysematous fœtus and the uterus became everted. The latter was replaced and the patient seemed comfortable and took food, when she suddenly showed great distress in breathing and in five minutes she was dead. One of the divisions of the pulmonary artery was blocked by an embolus. Pulmonary embolism occurs in man some days after an operation, and is usually fatal, but recovery has been noted. Sepsis is seldom found and the condition occurs in uninfected wounds. It seldom follows phlebitis of such a degree that it can be diagnosed clinically. It is suggested that owing to some injury thrombokinase is set free and commences the clotting. A clot may completely block the pulmonary artery with no evidence of clotting in a large vein.[3]

Masson, of Torquay, has recorded an interesting case of air embolism. He incised the teat duct for relief of stricture and then introduced air under pressure in order

to stretch the parts. A few minutes later the cow was dead. Such accidents have been recorded in human surgery following the introduction of air under pressure into the ureters and Fallopian tubes. Bleeding veins of scar tissue are particularly dangerous as they cannot retract and under pressure air may enter and reach the heart and lungs.

. . . . .

Traumatic Aneurisms—Hæmatoma.

So-called traumatic aneurisms are of frequent occurrence in cattle and rather rare in other animals. In man they usually result from the tearing or rupture of an artery, but in cows, especially, they appear to follow damage to veins and particularly those veins associated with the mammary system, the next commonest site being the vaginal region, followed by the ischial. Not seen in the cervical area, hæmatoma may be met with in the breast and axilla. A very large hæmorrhage under the shoulder was seen in a two-year-old heifer; the limb appeared as if pushed away from the trunk. The swelling, which was firm and fluctuating, disappeared entirely in about 30 days. It was not opened. The frequency of hæmatoma in cattle is due largely to horn thrusts by other cattle, but the thickness and strength of the bovine skin is a factor of great importance, since it is thus able to stand the strain, while the parts beneath, notably the blood vessels, are torn, the milk veins being specially vulnerable.

The extravasation of blood forces the tissues apart, so that a large cavity filled with fluid blood and soft clot is formed. The tissues around the swelling become matted together and fibrin becomes deposited upon them, so that in a short time a firm surrounding capsule is formed, while the shape and size of the swelling depend almost entirely on the resistance of the surrounding structures. In most cases the swelling forms rapidly, but it may be delayed for some hours. It is usually tense, painful at first and firm to the touch. Extensive bruising, so common in man, cannot be seen in cattle except in the vaginal region or the udder, where intense congestion and œdema may be noted. Infection and suppuration are not common unless there is some breach of skin surface, sometimes too small to be observed. In some weeks a spontaneous cure usually takes place, but the swelling may persist as a blood cyst. Traumatic aneurism is not a good term, as there is no true aneurismal sac. Strictly, the condition is a hæmatoma and its boundaries are the muscular sheaths and other connective tissues.[4] A hæmatoma may be mistaken for an acute abscess, a serous cyst, or a hernia and in some cases may co-exist with the latter, especially in the lower flank region, where the milk veins may be torn. Diagnosis in such cases is difficult. Hæmatoma should be suspected in cattle in all rapidly-formed, firm, well-defined, fluctuating swellings, and caution should be observed in opening them. It is, however, safe to do so after some days, though not actually necessary in many cases since spontaneous cure so often results. In the vaginal region evacuation is sometimes urgent. Exploratory puncture may confirm the diagnosis.

. . . . .

Spring Œdema of the Head.

A curious condition is sometimes met with in springtime and usually in cattle which have been yarded or housed during the winter months. The animals have little exercise and are generally rack-fed or, at least, the time spent feeding from the ground is comparatively short. After some months of this existence, with perhaps some dietetic deficiency the animals are turned to pasture and experience a complete change of environment and food. For hours on end the heads of the animals will be carried below the heart level and blood tends to lag in the veins, etc. Slight damage to the endothelial lining of the vessels ensues, with resulting œdema of the head and throat. An owner may become alarmed on finding several of his cattle with swollen heads, but improvement quickly follows if the animals are returned to the yard for a few nights. The parts acquire tone and the dependant position of the head is no longer followed by œdema. I have on a few occasions seen similar swellings in horses, in one instance the œdema being very marked. Professor Leonard Hill, experimenting many years ago, found that tame rabbits strapped to a board and then placed in a vertical position soon died—the abdominal veins filled and the brain suffered; on the other hand, wild rabbits bore the change of position well.[5]

Such swellings are liable to be confused with those of an infective character, but their painlessness, diffused nature, and disappearance on elevation of the head should remove any doubt. It would appear, however, that animals suffering from alveolar disease are more disposed to a spreading infection under such conditions, and some recent experiences tend to corroborate this view.

References.

1" Heart and Circulation in a Tropical Avitaminosis." *Lancet*, August 11th, 1928.
2" Comparative Physiology of the Heart." Clark.
3" Surgical Pathology." Wakeley and Buxton.
4" Science and Art of Surgery." Romanis and Mitchener.
5" Blood Vessels and Pressure." *Lancet*, February 14th, 1920.

Thallium Poisoning in Sheep.

Since 1920, when Thallium as a lethal agent was introduced in poisons for noxious rodents in the United States, it has been largely used in the control of prairie dogs, ground-squirrels, rats, mice, and other rodents of economic importance, but recently there have been reports of unusual mortality amongst sheep in areas treated with thallium-poisoned grain. Experiments by the author on sheep fed with thallium-poisoned grain showed that even when starving they accepted it with great reluctance, and no thallium could be detected in the viscera of sheep which had died on the suspected area. The M.L.D. for sheep is about 25 mg./kg., and it causes alopecia in sub-lethal doses down to 8 mg./kg. It can readily be isolated from the liver and kidneys of sheep killed by the poison, and *post-mortem* examination discloses irritation of the fourth stomach and duodenum, together with kidney degeneration. —J. C. Ward (*Journ. Amer. Pharm. Assoc.*, XIX., 6, p. 556). Ex *Pharm. Journ.*

Bovine Fœtal Monstrosity.

By H. Tudor Hughes, F.R.C.V.S., B.Sc. (Lond.), Owestry.

Freaks of nature are generally objects of greater interest in a museum—or, as befell the present case, in the side-show of a country fair—than in the routine of obstetrics in country practice.

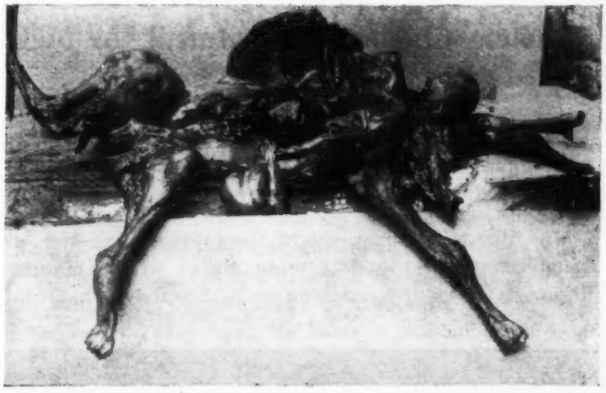
The case here described was encountered in a fully-developed cow with a roomy pelvis, but in spite of this advantage presented considerable difficulty in delivery. The presentation was anterior and at first it was thought to be a case of twins coming side by side, one from each horn, as the fœtus from the right cornu seemed to be rather the more accessible, this was selected for delivery first, and ropes applied to the head and feet accordingly. The ropes were then given to assistants to exert traction on fœtus No. 1, whilst an attempt was made to repel No. 2. As the latter moved forward every time traction was applied to No. 1, it was then inferred that there was interlocking of a foreleg of each fœtus at the elbow, or else that a foreleg of each was inadvertently selected.

On the principle that it pays to hold what one has succeeded in getting, another rope was applied to the other fore limb concerning which there was a doubt. On again applying traction, particularly on the last rope, there was still no difference, so the situation was distinctly more puzzling. As there was no movement of the one fœtus in relation to the other, strong traction was now ordered, with a view to bringing both within reach to discover the cause, when further and deeper palpation proved that one had to deal with a monstrosity.

The course of action decided upon was to embryotomise the fore limbs, and as in the present position one of the pair of limbs between the two necks was most accessible, this was selected for a start, the ropes being left on the other two fore limbs and head, but no traction applied.

The skin of the selected limb was incised from the scapula to the fetlock, and separated from the underlying structures, which done, all hands were ordered on the rope of this limb, the body being repelled.

After some manœuvring, the body of the monster was suddenly felt to rotate slightly, so that the head of No. 1 was able to be brought, tandem fashion, in front of the head of No. 2, and the whole mass made a slight movement forwards (*i.e.*, towards the operator).



As the cow had a wide pelvis and labour pains were still in evidence, the rope to the head was taken up and traction applied, as well as to the other forelegs that had previously been secured, in the hope of effecting delivery by forced extraction.

By alternately pulling on each rope in turn, and guiding head No. 2 behind head No. 1, patience, strength and industry were eventually rewarded, and once the widest part of the double fœtus was through the pelvis of the cow it came out with a sudden and unexpected rush, so that those in front fell upon the unfortunate man at the rear of the line, and severely injured him.

The freak was born dead, and as the local taxidermist had already shown a keen interest in some freak lambs, I told the owner not to dispose of it until I enquired whether he had any ambition to embark on something larger and more pretentious. Such being the case, it was brought in and a more careful examination made, as I suspected, from the fact that it had two separate heads and necks, four front legs and two tails, that the internal anatomy might prove interesting.

Post-Mortem Examination.

On opening the abdominal cavity, the mass of viscera appeared unusually large, and on drawing the bowels to one side it was evident that there were two separate and distinct stomachs, and each one with its own particular spleen. The liver was large, but not duplicated. In the thorax the normal contents of the cavity were present in duplicate, the most striking feature being the discovery of two separate and distinct hearts.

Calcium Gluconate Treatment for Milk Fever.

By T. Le Q. Blampied, F.R.C.V.S., Jersey, C.I.

May 10th.—This cow calved the previous day and was found completely comatose when visited in the morning. Figure 1 shows the condition upon my arrival at 9 a.m.

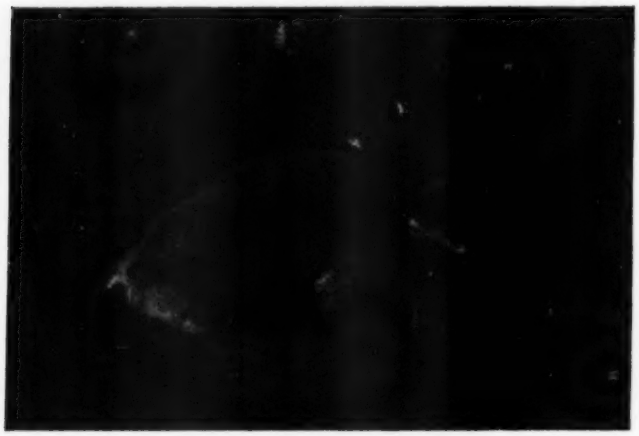


Fig. 1.

At 9.6 a.m. she was given 150 c.c. ten per cent. sterile solution calcium gluconate intravenously. The cow was then pulled back in the stall and rolled on to her other side.

Fig. 2.

Although the monster was very much in excess of the normal average size and weight of a calf, the cow fortunately went on well and no complications followed.

This freak, and his successful mounting of it, has been the cause of the old taxiderimist becoming a collector of monstrosities, as you will see from one of the accompanying photographs, the one in question being in the bottom right-hand corner.

At 9-9½ a.m. the second flashlight photograph was taken (fig. 2), shewing consciousness restored. She was now given 3 ozs. calcium granules dissolved in 3 pints boiling water subcutaneously, the solution being injected in quantities of 200 c.c. at several points.

At 3 p.m. the cow got up with a little assistance, when figs. 3 and 4 were taken. It was then perceived that she had strained the extensor pedis of her left hind leg, and this, in my opinion, accounted for her remaining down for such a comparatively long time (six hours) after injection.

Fig. 3.

Fig. 4.

May 11th.—As she had not thrown her afterbirth, I saw her again next day at noon, but found her down and unable to rise, but no signs of coma. She was then given 150 c.c. calcium intravenously. She got up at 3 p.m. without difficulty, when afterbirth was removed.

May 12th.—I was called again at 8 a.m. next morning, and found her in much the same comatose condition as on May 10th. She was given 150 c.c. calcium intravenously and 3 ozs. calcium subcutaneously. When seen at 2 p.m. that day, all symptoms of milk fever had disappeared and did not recur.

In this case the cow had fallen on her left side, and had worked herself to the top end of the stall in struggling to get up, and had then lain there unconscious for an unknown length of time with this under leg in an unnatural position, with the result that she had injured the extensor pedis.

Strain of the extensor pedis as a sequel to milk fever often occurs in cows kept tied in stalls, and that are found down in the morning. As treatment, I adopt hot fomentation and friction with a liniment. In cases that do not respond in a few days, I have had recourse to a blister. I have had cases where the injury to this muscle was so severe that the leg swelled to twice its normal size and the hoof became detached at the coronet. Such cases have remained down, and eventually have had to be destroyed.

In conclusion, I would like to thank Professor J. Russell Greig for his courtesy and kindness in lending me the blocks by which I am able to illustrate these notes.

World Poultry Congress.

The success of the World Poultry Congress, particularly of the comprehensive exhibition which was staged at the Crystal Palace, and which closed on Wednesday last, was proved by the steadily rising attendances throughout of the general public, and by public appreciation of the contribution it makes towards the development of a new but promising agricultural industry.

Opinion was unanimous that British stock, both for exhibition and productive purposes, is superior to all others in size, vitality, and condition. The collection of tested hens, which have qualified by consistent performance in a public laying test, was regarded by visitors as the most striking testimony to the advance of the laying test movement in this country, and it is likely to be reflected in a considerable expansion of the export trade in egg-producing stock.

Outstanding amongst many interesting sessions, were those of Wednesday, July 23rd, which provided opportunity for the study of bacillary white diarrhœa in the section for diseases, where Professors L. E. Card and E. Roberts, of the University of Illinois, dealt with inheritance of resistance of pullorum disease. They described investigations, which began in 1924, to study the variability in resistance of chickens inoculated with a 24-hour culture of *salmonella pullorum*, and comparison was made of survival among stock selected for resistance and chickens from unselected or control stock. The survival among the resistant stock was 66·6 per cent.; and among the control stock only 27·7 per cent.; and a series of tests from 1925 to 1929 led to the belief that resistance and susceptibility to infection by *salmonella pullorum*, the germ of bacillary white diarrhœa, are due, at least in part, to the existence of dominant hereditary factors.

Dr. Leo. F. Rettger, of Yale University, added to the interest in this section by telling of the present state of pullorum disease control in the United States. Several tests for identifying carriers are undergoing experiment, but the macroscopic agglutination tests promises to become the standard method of diagnosis.

The nutrition section devoted a good deal of attention to the use of cod-liver oil for egg production.

Tumours of the Brain in the Dog.

By H. W. Dawes, M.R.C.V.S., West Bromwich.

Judging by the paucity of literature concerning them, brain tumours in the dog are relatively rare, although other pathological changes in the brain and meninges are frequently encountered in that animal. New growth formations may involve the brain itself or its coverings, and they may be primary, or secondary to neoplasms in other parts of the body. Psammoma, the common tumour of the brain of the horse, is apparently not found to any extent in the dog, and in this animal, glioma, glioma-sarcoma, and carcinoma have been encountered in the brain, whilst affecting the meninges may be found fibroma, lipoma, sarcoma and myxoma. There does not appear to be any tendency in the dog to the formation of tuberculous growths in the brain and meninges. This is in contra-distinction to the tendency in cattle, whilst it has been stated that one half of the brain tumours met with in man are tuberculous in origin.

The symptoms produced vary widely and are of considerable interest to the clinician. They depend partly as to whether the growth actually invades the brain substance, or produces its effects by pressure on that substance. The relation of the growth to the roots of the cranial nerves also has a bearing upon the symptoms produced. Very often, such a growth produces local symptoms by causing pressure on the immediate structures, and finally produces, by increased intra-cranial pressure, what might be termed general symptoms. Of these general symptoms, much attention has been paid in medicine to the congestion of the optic papilla—so-called "Choked Disc"—and it is of interest to note that, in veterinary medicine, little mention has been made of its significance in cranial tumour, partly due to the fact that, in the past, a routine ophthalmoscopic examination of the fundus of the eye has not been made. This congestion of the optic papilla depends most probably upon increased intra-cranial pressure and not upon the size and situation of the growth itself. Disturbance of consciousness in brain tumour is generally slow and a considerable interval of time may elapse before signs are shown. In one of the cases recorded below, nearly four months elapsed after the onset of ataxia before the dog showed any degree of confusion mentally.

Slowing of the pulse rate and respiration may be noted, but vomiting is apparently not a marked symptom of brain tumour in the dog.

The local, regional or focal symptoms depend upon the position of the tumours, and hemiplegia and ataxia may be regarded as the most important. In ataxia due to cerebral disease, there is an absence of the faculty to determine the amount of muscle contraction necessary to carry out a given movement. This results in the taking up of unusual attitudes, the legs are often splayed apart, the reflexes are exaggerated, and high-stepping walking movements are common. In those cases where the cerebellum is the seat of the tumour, the symptoms of cerebellar ataxy are well marked, since the cerebellum is concerned with muscular co-ordination and the maintenance of muscle tonus in the fixation of a joint.

Paralysis of certain cranial nerves may be encountered—

Gratia reports a glioma, the size of a hazel nut, enclosing the Gasserian Ganglion and extending to the nuclei of 6th and 7th cranial nerves; Cadeac and Roquot have recorded paralysis of the trigeminus in a dog with an endothelioma near the root of the nerve.

Diminished sensibility, amounting to anæsthesia, of certain areas of the body may be marked.

Huytra and Marek have pointed out that disturbances of the senses of hearing, taste and smell sometimes occur, but they are difficult to observe with accuracy in the dog. Many of the ordinary actions, such as finding of food, locating of dishes containing food, etc., may be retained, but other familiar objects may not be recognised, and some usual movement of the dog such as begging for food, leaping on to a chair, or holding out a paw, may not be carried out, or, if done, executed in a slow and uncertain fashion.

An eight-year-old Irish terrier, seen by the writer, had been in the owner's possession for seven years. The attention of the latter was drawn by a rotation of the dog's head through about 45°, the right ear facing the ground, together with some inco-ordination of the right fore and hind limbs. On examination, the dog appeared as in figs. 1 & 2.

Fig. 1.

Slight difficulty in walking was noted, the legs being widely splayed and the right fore and hind leg being used in a stilted fashion. A tendency to fall or lean on the left side of the body was marked. Sense of sight and hearing was apparently normal, and when the animal's attention was attracted, the rotation of the head persisted. The dog was extremely bright and lively; appetite was good, but when feeding some difficulty was shown in reaching down to the dish, and the legs were widely splayed to permit this. A provisional diagnosis of a cerebellar lesion was made, the owner being anxious to keep the dog whilst it remained well and intelligent. Small doses of potassium iodid. were administered. The condition of the animal remained unchanged for about four months, when ataxia became more marked and the dog had great difficulty in ascending steps, and negotiating small obstacles.

No vomiting was observed during this period and the animal remained in fair bodily condition. Nearly six months after the onset of symptoms, the dog was destroyed. On *post-mortem* examination the condition seen in figs. 3 and 4 was noted—a soft reddish-brown tumour was found attached to the right lateral lobe of the cerebellum. No other abnormality of the brain or meninges could be discovered.

Fig. 2.

Fig. 3.

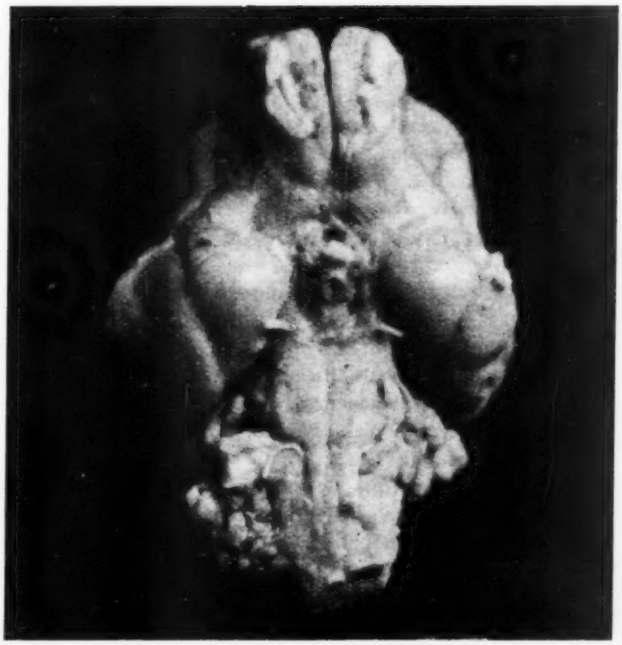


Fig. 4.

A seven-year old black and tan terrier, seen by the writer, was noticed by the owner to have difficulty in turning, the hind limbs being splayed from the body and lifted in a jerking string-halt fashion when walking, whilst the left foreleg knuckled at the carpus. At the time of examination the animal was in fair bodily condition, but showed great dulness. The head was carried almost on the ground and rotated to the right of the middle line. The dog made repeated turning movements to the right and continually fell on to the left side. Sense of hearing was greatly diminished—the pupils were markedly contracted and reaction to light practically absent. Ophthalmoscopic examination of the fundus was unsatisfactory owing to this. An area of the cheek alongside the left upper lip showed diminished sensibility to pin pricks when compared with a similar area on the right side. The respiration and pulse rates were very slow; at times, pushing forward movements were shown, and the dog would stand for a few minutes with the head firmly pushed against a wall and the nose touching the ground. Figures 5, 6 and 7 well illustate the condition. The general condition of the dog grew worse and it was eventually destroyed about six weeks from the apparent onset of symptoms. On *post-mortem* examination a small, reddish-brown tumour was found involving the left and central lobes of the cerebellum adjacent to the roots of the seventh and eighth cranial nerves.

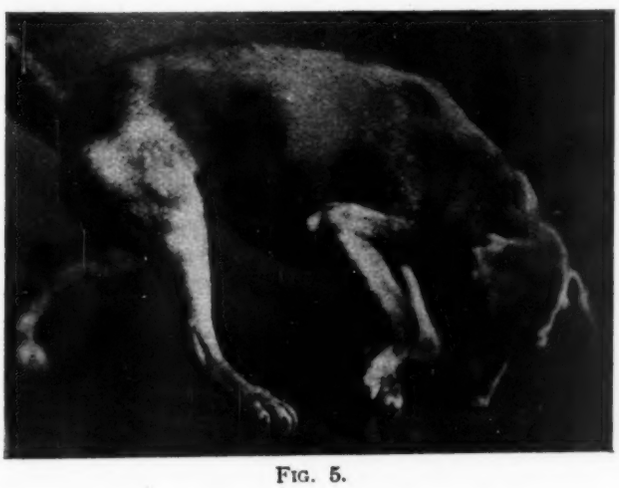


Fig. 5.

Fig. 6.

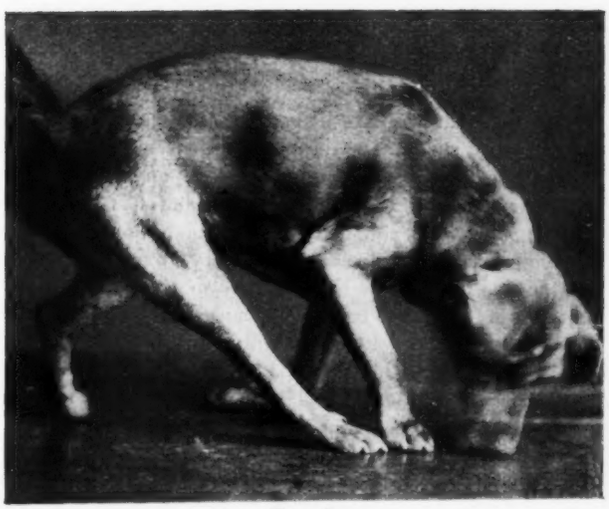


Fig. 7.

I am greatly indebted to Professor Tom Hare for the attached pathological report on the specimen seen in figs. 3 and 4.

"There was an irregular-shaped mass of the growth extending from the fourth ventricle outwards between the junction of the pons and cerebellum out to the external aspect of the right lateral lobe of the cerebellum. The tumour was of a soft consistency and to the naked eye had the appearance of ependyma. The tumour had grown at the expense of the right lateral lobe of the cerebellum, but it did not appear macroscopically to have infiltrated the cerebellum, the loss of tissue being due to pressure atrophy. At the external aspect the tumour produced a large bulky mass about the size of a horse bean within the cerebello-pontine angle.

Intussusception and Resection in the Dog.

By Harold Stainton, F.R.C.V.S., and Kenneth Ollerhead, M.R.C.V.S., Kensington.

Although considerable advances have been made in canine surgery within the last few years, there remains much to be done, particularly in regard to intestinal technique.

It must be admitted that, whereas operations on stomach, bladder, uterus, etc., offer no particular difficulty, the intestine appears to be less tolerant of operative interference and results are not so consistently good.

Apart from technical surgery, one might ascribe many failures to late diagnosis. For instance, in the majority of cases presented for operation the same picture is revealed on opening the abdomen, namely, a large portion of necrotic bowel and probably well-established peritonitis. One excuse for late diagnosis is to be found in the apparent insensibility of the canine intestine and consequent absence of localised pain. Practically speaking, we know that a dog will endure an intussusception or carry a foreign body for long periods without any definite diagnostic symptom or indication of pain.

Palpation and X-ray may reveal a foreign body, but not *always*. Intussusception is not easily discoverable by palpation in the early stages, nor is X-ray very helpful.

The sole reason for recording this case is to show the extraordinary response to simple and hurried surgery on the part of a dying dog, and to outline the after treatment, as a matter of practical interest.

In using the term "simple surgery," it may be mentioned, incidentally, that we have had no success with mechanical contrivances, such as Murphy's button and the rest, although the use of a gelatine cylinder appears to offer better results, where end to end anastomosis is indicated.

Again, the word simplicity is particularly applicable to the use of sutures. In canine surgery, the Interrupted, Continuous, Lembert or Halsted fulfil most needs. In the majority of cases, a continuous suture through all the coats, followed by a Lembert seal, will suffice.

It is, of course, established that, time permitting, lateral anastomosis is the safest and best method, but, to quote Lord Moynihan: "A method that is simple and applicable to all forms of anastomosis, speedy because of its simplicity and safe because of all its attributes, is the only one that is destined to survive."

To come to the case in point:—

The subject, a Dalmatian aged 11 months, was admitted to hospital in a moribund condition with a history of having been ill and under treatment for persistent vomiting, during the past two weeks.

The dog was too weak to stand, body temperature subnormal, extremities and gums cold, pulse thready and scarcely perceptible.

Diagnosis was easy in this case, as a large, sausage-shaped mass was discoverable on palpation. In spite of the hopeless outlook the owner consented to a speculative operation, on the understanding that the anæsthetic should be pushed if the operative findings gave no hope of useful recovery.

Accordingly, the patient was placed on the operating table, shaved and prepared as quickly as possible.

Very little anæsthetic was required; in fact, the main anxiety was to keep the dog alive during the proceedings. Actually, it consisted of an injection of Waite's over the seat of incision, and cautious administration of A. C. E.

On opening the abdomen, a colic intussusception about nine inches in length was revealed. By careful manipulation, this was reduced to a length of three inches, which consisted of the usual mass of adhesions. By good fortune, the intestine on each side was comparatively healthy and similar in width of lumen. For the sake of speed, it was decided to risk a simple end to end anastomosis. Briefly, the method adopted was as follows:—

The two ends of sound intestine were clamped by bowel forceps. The adherent mass and triangular piece of mesentery were ligatured off and removed. The leaking mesenteric vessels having been tied, the two ends of intestine were brought into apposition and anchored by one interrupted gut suture through all the coats, at the mesenteric border, including the serosa. It is, of course, essential that ligatures should begin from the mesenteric attachment and should be applied, throughout, with a view to serous adjustment. The next step was to unite the two ends by a continuous gut suture. The union was completed by a single row of Lembert sutures with a fine margin.

Only sterile saline swabs were used throughout the operation, and the abdomen was closed in the usual way.

The operation completed, the dog was packed up in blankets, with hot-water bottles and received ten ounces of normal saline solution subcutaneously, followed by 2 c.c. of brandy an hour later.

Within twelve hours the extremities and gums were warm, and the pulse much improved.

Two saline and brandy injections were given on the second and third days; also, one tablespoonful of albumen water and sugar water, alternately, every hour-and-a-half. From this point, all nourishment was taken voluntarily.

On the fourth and fifth days, albumen water and Bovinine and water, alternately, every hour-and-a-half.

On the fifth day, first action of the bowels by means of soap and water enema.

On the sixth day, first solid food allowed, namely, small quantity of bread crumbs soaked in Bovinine.

On the seventh day, albumen water, bread crumbs, Bovinine and junket.

On the eighth day, diet supplemented by small quantity of cooked brains. Enema again necessary.

On the ninth day, fish and brains.

On the tenth day, a little finely-scraped raw meat.

On the eleventh day, first normal action of bowels, without assistance.

From this point, ordinary solid meals were gradually established. As previously mentioned, the patient lapped up everything, voluntarily, after 48 hours—and it may be added that, from the sixth day, he was ravenous.

"On microscopic examination the tumour is shown to be an ependymal glioma, consisting of capillary masses each of which is composed of a central blood vessel within a loose stroma and lined by for the main part cylindrical, but occasionally oval or polygonal, cells containing large oval hyperchromatic nuclei. For the most part these lining cells appeared in single layers, but on some of the processes they are arranged two or three layers deep.

"No evidence of malignancy was apparent in the sections."

Acute Endometritis in the Bitch.

By W. R. McKinna, M.R.C.V.S., D.V.S.M. (Vict.).

This inflammatory condition of the uterus associated with the presence of pus organisms presents a problem demanding care in diagnosis and the subsequent selection of a mode of treatment which must be energetically carried out if the patient's life is to be saved.

The chronic catarrhal form of endometritis can exist for some months without causing any undue disturbance of health, but frequently this type flares up into an acute condition calling for immediate attention.

Endometritis occurs in the bitch at any age, with or without any previous period of pregnancy.

Following after parturition, it may be the result of a dead fœtus or fœtuses, or retention of the after-birth, or it may arise from obstetrical intervention by the surgeon.

Uterine infection in the maiden bitch generally occurs between the ages of six to nine years, but I have recently encountered such a condition in a fox terrier bitch a few months after her first period of heat.

The type of dog affected is usually that in gross bodily condition as a result of over-feeding and lack of sufficient exercise. These factors are probably important contributory ones towards the causation of the disease.

The onset of trouble in these cases is at first insidious and slow, and the usual history is that the animal has been in normal health shortly before being brought for examination. This time often coincides with the date of the œstral period, and questioning of the observant owner sometimes reveals the fact that the last period of heat was abnormal, either in duration or alteration in the nature of the discharges.

Causation

Those cases occurring after parturition are easily understandable, in view of the ease with which infection may take place at that time. Endometritis in the bitch that has never been mated and has never bred is, however, more difficult to understand. It does not seem probable that sepsis of the uterus in the majority of cases arises from any general systemic infection, as there is usually no previous history of abnormal health to suggest this. I am inclined to hazard the opinion that infection takes place *via* the vaginal canal during œstrum, either from loose fæcal discharges soiling the vulva, or from actual contact with the ground. The possibility of accidental coitus without conception must also be considered.

Symptoms.

In the maiden bitch, one usually encounters at first a general malaise accompanied by occasional vomiting. The already-fat animal appears to be putting weight on rapidly, due to the quickly distending uterus. Abdominal palpation reveals areas of tenderness high up on both sides of the abdomen, while later a board-like tension of the whole of the abdomen may be found.

Swelling and congestion of the vulva and evidence of uterine discharge may be observed, but these symptoms are not invariably present. Certainly, the leaden-coloured purulent material only leaks through a tightly-closed *os uteri* intermittently in some cases.

The animal's temperature is usually raised one or two degrees above the normal, and the pulse rate is invariably rapid. Respiration may be laboured if the abdominal tension is extreme.

There is naturally considerable difference in the degree of symptoms exhibited in different individuals, but the onset of endometritis, although in many cases slow at first and almost unnoticed, eventually produces a rapid climax with progressive prostration.

Diagnosis has to be thorough and careful, as prompt intervention is necessary if the life of the patient is to be saved.

Infection following upon parturition reveals itself within 24 to 72 hours, and the interpretation of the symptoms is comparatively simple.

The bitch's temperature is high, 104° F. to 105° F., and the pulse rate rapid. There is almost complete inappetence, and disregard of the newly-born puppies. A dark, stringy, bloodstained, and often offensive uterine discharge is always evident.

Treatment.

Uterine infection contracted following parturition can be combated by the use of antiseptic douches, as the *os uteri* is still open and satisfactory irrigation can be carried out. It is, of course, necessary to observe all the routine of surgical cleanliness, especially as regards the use of sterile catheters and sterile solutions for douching. Fluid should never be left in the uterus, but should be gently expressed by pressure on the abdomen, the animal being raised by the fore legs off the ground. This lavage should be conducted two or three times daily until there is evidence of the overcoming of infection.

The use of internal antiseptics and good nursing are additional necessary adjuncts to treatment. A preliminary injection of ·5 c.c. or 1 c.c. of Pituitrin is often of service in hastening the involution of the uterus.

Endometritis in the maiden bitch cannot be satisfactorily attacked by douching methods. In my experience, the *os uteri* is never dilated sufficiently to allow of any satisfactory lavage, and one has to resort to other methods.

The value of Pituitrin in these cases was the subject of an article by Collett and Hobday in the *Veterinary Journal* of January, 1926. A number of very successful results are recorded following its use, hypodermic injections of 1 c.c. being given daily or at slightly longer intervals.

My own experience is that good results follow in about one-third of the cases encountered, since this line of therapy was suggested, and, in such, recovery is remarkably rapid and seldom recurrent.

Failure to respond to this uterine stimulant occurs, I think, when the uterine cornua are very distended and there is no relaxed condition of the *os uteri*, thus preventing the escape of the purulent discharges.

If no relief is given by two or three injections of Pituitrin and there is no abatement of the severity of toxæmia present, immediate resort to abdominal section

---

For success in such a case, it is obvious that after-treatment is all-important. This, in the main, consists of the proper diet and strict rules as to amount and time of administration.

At the time of writing, five weeks after the operation, the prognosis appears to be reasonably good.

and hysterectomy is indicated. A waiting policy tends to invite disaster.

Concerning operation procedure, personal experience has suggested some of the following precautions. Whilst one almost always uses morphia as a preliminary to general anæsthesia in the dog, I have found its use to be attended with danger in the toxic type of patient frequently encountered in cases of acute endometritis. Its depressant effects can be so marked 24 hours after operation that the animal may never arouse from its stupor. Although it is a considerable disadvantage to have the excitement stage produced in chloroform anæsthesia when a narcotic is not previously used, yet recovery from the anæsthetic and shock takes place more readily and more surely.

Whilst removing the uterus, it is also advisable to include the ovaries, and as this is difficult when the cornua are greatly distended, considerable care must be taken to place the ligatures firmly around the ovarian vessels, and also round the ends of the cornua, to prevent any leakage of pus. The stump of the cervix, after securely ligaturing, is dealt with by cauterising with pure carbolic acid.

Owing to previous experience of buried suture trouble when silk has been used, catgut is preferred for this type of suture, although the material is more difficult to manipulate.

On examination of the removed organ, one can only express astonishment that the animal has shown so great resistance to absorption of toxins, which must have been taking place for a considerable period of time. It is not uncommon to find that the uterus and its purulent contents weigh up to 2½ lbs. in a medium-sized dog.

If the patient is constitutionally strong and the toxæmia not too far advanced, it is remarkable what an improvement takes place in the animal's general condition within 48 to 72 hours.

Indeed, the results are so uniformly good if the patient is in an operable condition, that one should never hesitate to advise surgical intervention after a reasonable period of expectant treatment has been tried.

Foot-and-Mouth Disease.

The policy of the Ministry of Agriculture in the wholesale slaughtering of contacts with diseased animals, though adversely criticized from time to time, has proved entirely successful in stamping out foot-and-mouth disease in this country. Great Britain has now been free from this scourge for six months, the last outbreak, a comparatively slight one, having occurred just before Christmas. It was speedily conquered, however, thanks to the prompt action of the Ministry's officials. During the last seven years there have been many malignant attacks, those in 1923 and 1924 proving the worst. They taxed all the skill and energy of an army of veterinarians and other experts. The work has been costly, mostly on account of the sums paid as compensation for slaughter. In 1923 the amount was nearly two and a quarter millions, while in the following year it exceeded a million and a quarter. Since 1922 some 350,000 animals were compulsorily slaughtered, and upwards of six millions paid to their owners in compensation.

Mutilation of Poultry.

By John P. Rice, B.Sc., M.R.C.V.S.

Veterinary literature contains few references to the mutilation of the lower animals by man, probably because this type of injury is not easily diagnosed. In view of the apparent rarity of the condition, the writer deems it desirable to place on record a case amongst poultry which he encountered prior to practising in Ireland.

The history of the case, as given in a letter from the farmer, was that recently he had lost about two dozen valuable birds, the fowls either being found dead on the nest or surviving only one or two days after they were noticed to be ill. Only Rhode Island Red pullets in lay were affected, although Leghorns were running in the same field. A *post-mortem* examination by the owner showed a fully-formed egg in the oviduct of several birds, indicating that the disease had taken a short course. In some of the pullets a yellowish discharge from the vent was observed during life.

The carcass of a so-called typical case was received by the writer on the day following death. The body condition was good and no external signs of disease were seen. The body cavity contained several large blood clots, the liver was ruptured and the cloacal end of the oviduct was perforated. The edges of the perforation were irregular and the lesion was not obviously organised. Peritonitis was not observed. The whole *post-mortem* picture suggested that injury was the cause and that the ordinary type of ruptured oviduct so commonly encountered in poultry was not in question. Bacteriological examination and animal inoculation gave negative results as regards specific disease. Unfortunately at this stage a search was not made for mammalian spermatozoa.

A report was sent advising the farmer that the losses were probably due to mechanical injury and that he should take steps to ascertain its origin. It is not known to what extent he pursued his enquiries into the matter, but the deaths continued to occur at more or less regular intervals. The writer then began to doubt if the specimen he had examined had been a really typical case, and was prepared to regard it as merely an odd bird which had been injured by some projection in the trap-nest or elsewhere. Support was lent to this view by the failure of the farmer to notice any internal injury in the birds which he examined.

The farm was then visited and the confidence of the writer that the deaths were due to mechanical interference was immediately restored by the *post-mortem* examination of a second fowl. The lesions exhibited were substantially the same as in the first bird, except that the cloaca was perforated instead of the oviduct. Subsequent microscopical examination of material from the cloaca and body cavity did not reveal the presence of any spermatazoa.

Enquiries were then made regarding the persons who had access to the birds and it was found that, apart from the mistress who visited the houses to collect eggs, the poultry were tended by a farm hand, aged about 18 years. This youth had a sleepy, degenerate appearance and seemed the most likely to be afflicted with psychopathic tendencies.

The writer's suspicions were made known to the farmer and he was advised to dispense with the services of the youth or to employ him on other work. In addition, it was recommended that the poultry houses should be locked and the keys kept in possession of the family.

Effect was given to the recommendations and the losses immediately ceased.

The reader will have noted that only Rhode Island Red pullets in lay were selected for mutilation, whereas Leghorns in the same field escaped. The reason for only one breed having been injured was apparently because they occupied a house situated about 100 yards from the gable end of the farm-house, which did not permit a direct view of the birds from the dwelling. The Leghorns, on the other hand, were housed near the farm-house and could be partly overlooked from the front windows. One can only surmise why birds in lay were specially chosen, but it is reasonable to suppose that this was done because they could be easily caught while on the nest.

Cases of maiming must always present difficulties to the veterinarian. They are of such rare occurrence that the investigator is inclined to disregard mutilation as a cause of losses and to seek a solution of the problem in some other direction. Added to this are the consequences which may follow for the practitioner who wrongly suspects or accuses a person of such malpractice. Farmers are not responsive to the suggestion that their staff includes a culprit, and little effort is made to detect the offender. In spite of these obstacles it is clearly the duty of the veterinarian, once he has established a diagnosis of mutilation, to communicate it to his client, together with such advice regarding prevention as the circumstances indicate.

Macqueen Testimonial Fund.

Fifth List of Subscribers.

	£	s.	d.
Amount already acknowledged	568	13	6
Sidney T. A. Amos, Esq.	5	5	0
J. Richard Hudson, Esq.	2	2	0
J. Lamb Frood, Esq.	2	2	0
Oscar Stinson, Esq.	2	2	0
Major E. Wallace	1	1	0
Professor J. J. O'Connor	1	1	0
W. Findlay Houston	1	1	0
J. T. Edwards, Esq.	1	1	0
Professor G. H. Wooldridge	1	1	0
W. K. Townson, Esq.	1	1	0
W. Nairn, Esq.	1	0	0
Major Andrew Spreull	0	10	0
	£588	0	6

Diseases of Domestic Animals from the Human Angle.*

By O. Charnock Bradley, M.D., D.Sc., M.R.C.V.S., Principal, Royal (Dick) Veterinary College, Edinburgh.

It is natural that on the occasion of an assembly of the nature of the present Congress, diseases of animals should be regardly mainly, almost entirely, from the point of view of the sanitarian. This is not only natural, it is right and proper and within the function of such a Congress, for how animal diseases affect the health and well-being of the people is of surpassing importance. They constitute a factor in the environment of man, and condition and qualify his existence. They are a constant menace. But man, fortunately, is able to judge, assess, and—within limits—modify his environment and set up defences against attacks upon his normal bodily condition. In a manner that is permitted to him alone among the creatures of the earth, he is able to extend his knowledge of the sources, direction and nature of the dangers that surround him, and elaborate, alter and strengthen his defences. As civilisation has become more and more intense, and its concomitant penalties more and more pronounced, man, in general, has been forced to take a greater and more intelligent interest in all that colours his life; and since health, happiness and prosperity are inextricably blended, it is inevitable that he should come to demand as full a protection from disease as existing knowledge permits, and that additions to that knowledge should be made as abundantly and as rapidly as science and the scientist's abilities render possible. At the same time, disease having in all time held much of mystery as well as dread, he is curious to learn as much as he can of how disease is caused and how it can be controlled. And herein lies one, at least, of the functions of a Sanitary Congress.

If we may argue from what is told us of existing primitive peoples, we may conjecture that at no moment in man's history has he been entirely free from this perfectly natural curiosity; but it is within comparatively recent times that curiosity has become acute and exacting.

At what precise moment in history was developed the germ of the conception that disease is not only a danger to the individual but also to the community, it would be difficult to say, and fortunately, is not our present concern. It is sufficient to say that historically the conception is far from being modern. What does concern us, however, is the extraordinary and rapid growth of the appreciation of the communal importance of disease during the last hundred years. In this connection it is interesting to recall the words of Sir John Simon, who, writing in 1899, said :—

> "At the present time, when care for the public health has become a familiar branch of local government, employing day by day many thousands of permanent officers, and having tens of millions of money already sunk in the mechanical appliances which it finds needful, the recollection that, when the reign

* Lecture to Congress, Royal Sanitary Institute, Margate, June, 1930.

(that of Victoria) began, little more than 50 years ago, there existed hardly a glimmer of intelligent public interest in this question, shows indeed an astonishing contrast. The old commonplace, that without health is no wealth, has been spreading in the national mind, as with the force of a new discovery; and the spreading of the old truth with so new a life has been in response to the progress which has been advancing from a century before in the resources of scientific medicine. Disease, always enough understood to be an evil, had gradually come to be seen as an evil which could often be prevented; and from the time when the community began to know that, with good government, it could, at its option, escape many terrible calamities of disease, health necessarily began to take rank as an object of practical politics."

Beyond question, true as Simon's words were as they indicated progress in the Victorian age, the historian, dealing with the development of public health in post-Victorian times, may proclaim, equally emphatically, even more rapid expansion, in every direction, of knowledge and the application thereof. Among a multitude of facts in support of his thesis, he may point to the improvement in man's expectation of life. In 1928 the average length of life was 56 years, as compared with 47 in 1910, 25 at the close of the eighteenth century, and 20 in the sixteenth century. Many factors have gone to produce improved conditions, and the Public Health Acts undoubtedly rank first, but not least important is extension of the knowledge and control of animal diseases and the protection of man against disease transmitted from animals.

The words of Sir John Simon, just quoted, remind us that public health administration, as we know it, has a history of less than a hundred years, for it was not until 1847 that the first regular appointment of a medical officer of health was made. To Liverpool belongs the proud honour of making the first appointment. But, brief history notwithstanding, in the light of modern developments, it seems strange that many years were allowed to elapse after the passing of Public Health Acts before administrators awoke to the fact that veterinary science was in a powerful position to aid in the preservation of the health of the people. So far as I am aware, Thomas Goodall Nasmyth, sometime medical officer of health for Fife and Clackmannan, was the first to point out what is now regarded as very obvious. Commenting on Section XXVI of the Public Health (Scotland) Act, 1867, he says:—

> "This section is one of the most important in the Act . . . The knowledge of the subject which he (the sanitary inspector) possesses should not alone be confined to the various articles mentioned; he should also know what diseases of animals render their flesh unfit for food, and what are the physical signs in the living animal by which he would form an opinion as to the nature of such diseases. Here the functions of the veterinary surgeon are infringed on, and it is highly desirable that every fully equipped sanitary authority should have available the services of a consulting veterinary surgeon."

Fortunately, the desirable co-operation indicated in these words has been effected in many places; but I believe that, unhappily, there are still authorities—and authorities that ought to stand as exemplars to others—that, even now, do not entrust the inspection of meat to those whose training may reasonably be regarded as having rendered them best fitted to carry it out.

Natural though it may be for a Sanitary Congress to consider animal disease from the point of view of transmissibility to man, and all essential though this point of view may be, it is not amiss, once in a way, to remind ourselves that there is a much wider human angle also of importance. The human angle contains lesser angles, of which the sanitarian's is only one. For example, the economist asks: How much does animal disease cost the country every year? Is the cost increasing or decreasing? What are the measures being taken to effect control or diminution of the cost? Are further measures desirable, practicable, or possible? And, no doubt, other questions.

It would be no easy matter to answer the economist, for it is impossible to estimate the annual monetary loss with any degree of precision; but with an animal population (in 1928) of 7,240,281 cattle, 23,968,314 sheep, and 3,166,547 pigs, no one could be accused of over-statement if he said it must be considerable. Diseases that produce clinical symptoms, it will readily be conceded, clearly result in loss that is great or small according to the gravity, duration and termination of the disease. But there are smaller disturbances of the working of the animal machine with no clearly manifested physical change, that yet must result in *some* impairment in the quality or quantity of meat, milk or work. If we assume that disease in its various forms results in the loss of only a farthing per head of the animal population per annum, no elaborate mathematical calculation is needed to show that the total is far from negligible.

The expert in nutrition could doubtless pursue further this aspect of animal-disease and disease. He might reasonably contend that the flesh and milk of an animal not in absolutely perfect health declines in a greater or less degree from the highest point of nutritive value, and that, consequently, there is another, more obscure, possible source of loss.

Closely associated with what has just been said, and still included within the economist's angle, is the loss incurred in the condemnation of meat as unfit for human food. A fairly close approximation of this could doubtless be arrived at by the collection and collation of returns made by officials throughout the Kingdom. For our present purpose, however, this is not necessary. All that is desired is to suggest that appreciable loss occurs as the result, direct or indirect, of animal disease; and this can be done by glancing at returns from four or five centres for the distribution of meat. It appears that, in 1928, considerably more than 2,000 tons of meat were condemned at Smithfield, Islington, Manchester, Birmingham, and Edinburgh. What proportion this bears to the probable total for the Kingdom may possibly be surmised by those who are actively engaged in the inspection of meat. Whatever it may be, it is evident that animal disease materially diminishes the food resources of the country; even though it has to be remembered that meat may be condemned for reasons other than the presence of pathological conditions.

Then there is the angle of the human pathologist, who seeks knowledge wherever it may be found. Within his province falls, or should fall, knowledge derived from the study of diseases of man, of wild and domestic animals, of animals other than mammals, and even of plants. Diseases of the lower animals always hold out the promise

—frequently vain, unhappily—that they will throw light on the diseases of man. For example, when the *Field* distemper investigation was initiated, there were those who hoped that some truth or other would be revealed that would solve, or at any rate simplify, the problem of human influenza. Though the hope does not appear to have been fulfilled, the investigation has, nevertheless, excited the interest of the comparative pathologist scarcely less than that of the veterinary practitioner; for canine distemper belongs to a group of diseases—if we may regard them as forming a single group—that to the pathologist and clinician have much of mystery and fascination, and are at the present time the subject of intensive study.

To the same group also belong foot-and-mouth disease, rabies, small-pox, influenza, scarlet fever, and other diseases, all having the common feature that they are highly infectious, but the casual agent cannot be demonstrated under the microscope and apparently can only be cultivated in the presence of living cells. In short, they are due, as it is said, to ultra-visible viruses, and thus differ from bacterial diseases like typhoid, diphtheria, tuberculosis, etc., the causal agent of which can be detected under the microscope and can be isolated and cultivated in artificial media outside the animal body. From investigations conducted at the London Hospital, it appears very probable that the disease of which we read so much in the daily Press a short time ago, psittacosis, is a virus pneumonia; and it has been suggested that further research may help in the detection of the elusive cause of human influenza.

But virus diseases are not confined to members of the animal kingdom; they occur in plants as well. It may be, indeed, that the study of plant virus diseases—at present being conducted with much vigour—will help in the elucidation of puzzles offered by diseases of animals. Already the phyto-pathologist has shown that, in several virus diseases of plants, bodies, strangely reminiscent of the Negri bodies found in the brain cells of rabid dogs, are present within the cells of affected plants. He appears to be persuaded also—and this is a point of considerable moment—that virus may be carried by insects from diseased to healthy plants; and—a yet more momentous fact, if fact it is—that in one plant disease at any rate, "aster yellows," there is an actual incubation period in the body of the insect vector. How much these discoveries will ultimately colour the vision of the animal pathologist remains to be seen.

There are many other profoundly interesting features of virus diseases, and certainly not least of importance is the possibility that the virus of the same disease may occur in different strains with different potentialities. We are told, for example, that there are three different strains of the virus of foot-and-mouth disease, and—a circumstance of great practical moment—that these strains are not mutually protective.

Apparently a somewhat similar condition obtains in the case of the virus of rinderpest, but with a difference. A rinderpest vaccine of bovine origin, it has been shown, is unsatisfactory when used as a protective for goats, and is even less efficient when used for pigs. In this instance a species difference of strain is the apparent explanation; whereas in foot-and-mouth disease the difference is individual.

Again, though a virus of distemper of dogs is very virulent for the ferret, an alteration of some kind obviously occurs dependent upon the species of the host. For we are informed that, while one dose of ferret vaccine is sufficient for a ferret, three doses of ferret vaccine are required to produce the same effect in the dog; and while one dose of dog vaccine is sufficient for a dog, three large doses of dog vaccine are useless for a ferret.

Diseases of animals, viewed from the standpoint of the pathologist, present many facets, and among them is the fact that while one disease shows no preference for a particular species as host, another displays either a decided elective choice, or, if not confined to a particular species, has more or less well-marked species peculiarities.

Again, while there are strains of viruses, dependent for their characteristics either upon the species of the host or upon some less obvious factor, there are also strains in microscopically visible disease-producing organisms. This is a fact familiar to every bacteriologist; and someone somewhere has ventured to suggest that much of our temperament depends upon the particular strain of *Bacillus coli* we happen to harbour. But the occurrence of strains is evidently not limited to those minute organisms to which the old, broad and useful name of "bacteria" may be applied. The plant pathologist has demonstrated notable peculiarities in the fungi that produce what appears to be the same disease in different species of plants. Those of us who dabble in gardening are unhappily all too familiar with the condition that is commonly known as "mildew," and, unless we happen also to be mycologists, we have doubtless supposed that "mildew" is more or less the same upon whatever plant it may occur. The plant pathologist, however, knows better, and he knows that the "mildew" of one species is not necessarily infectious for another. This is perhaps not altogether surprising. But what does cause wonder is the statement that, while "mildews" of cereals are all alike microscopically and cannot be distinguished structually, the causal organism from one kind of cereal will not produce the disease in another and closely allied cereal. That is to say, there are races and strains that cannot be distinguished by form, appearance, or mode of growth, but evince an absolute election in the choice of host. Or it may be that the tissues of the resistant host either lack an essential or possess an inimical constituent. Whichever may be the true explanation, it may be a parallel to that of peculiarities observable in diseases of man and animals.

And now the sanitarian's angle. Many are the diseases of animals that may be transmitted to man, but it will be agreed that that which receives most attention by the public is tuberculosis. Much has been written—and even more spoken—of the disease, and this is perfectly understandable. A disease that takes so heavy a toll of human life and that may manifest itself in so many distressing forms, a disease that is so widespread, that spares no class of the community, that is one of the heaviest penalties of civilisation, and that, in theory at any rate, ought to be controllable, is bound to cause deep and serious concern to laymen and scientist alike.

No intelligent member of the public is now unaware that tuberculosis is caused by a micro-organism, of which the bacteriologist recognises three types—human, bovine and avian—distinguishable, not so much by their morphological

features as by their mode of growth in artificial media. It is conceivable that the differences that exist between the types have been produced by chemical and physiological differences in the hosts they most commonly inhabit, and it requires no very vivid imagination to postulate a common origin. Indeed, more than once it has been suggested that there is an ultra-visible form of the bacillus from which the microscopically demonstrable organism may evolve; but it must be admitted that, though investigators have not neglected the possibility, competent observers have failed to convert a supposition into an ascertained truth.

Unfortunately, the human body is susceptible to the attack of all three types of the tubercle bacillus or mycobacterium, but fortunately not in equal degree. The avian bacillus has not been recorded in human cases with any alarming degree of frequency, though instances have been reported; and two such records are of peculiar interest, inasmuch as they refer to renal tuberculosis in children, conjectured to be due to the eating of raw eggs.

The bovine source of infection, on the other hand, is a very serious danger and of such moment that, even if we accept the more moderate of the figures given by those who estimate the percentage of incidence in the human subject, none can reconcile it with his conscience to let nature take its course in the expectation that finally the human body will acquire sufficient resistance to repel the invasion. Means must be sought to lessen the danger, even if it cannot be entirely removed.

Inasmuch as the bovine bacillus is commonly conveyed to man by milk—a food that we are told is not consumed in this country in the quantities that are right and proper—it is clear that every effort should be made to lessen, and, if possible, completely eradicate bovine tuberculosis. That eradication is desirable, none will deny. Whether it is practicable, and by what means, is not entirely a question for the pathologist and practitioner; it requires the consideration of the economist also.

While it must be admitted that conditions in Great Britain and in the United States are not identical, it is, nevertheless, of value to us in this country to know how the war against bovine tuberculosis is being waged on the other side of the Atlantic. In 1917, the Federal Government formulated a scheme of " accredited herds " based on the result of the tuberculin test, and the United States Department of Agriculture set up a Tuberculosis Eradication Division. By the scheme, three categories of herds and collections of herds are recognised. An " accredited herd " is one in which there have been no reactors to two annual or three semi-annual tuberculin tests. An " accredited area " is a definite area—township or country—in which the disease has been eradicated. A " modified accredited area " is one in which all the cattle have been tested and not more than 0·5 per cent. have reacted. In 1918, when the scheme was first put into operation, 134,143 cattle were tested and 4·9 per cent. reacted; the number of herds " accredited " was 204. Seven years later, the number of cattle tested was 7,000,028, of which 3·1 per cent. reacted. The number of " accredited herds " was then 72,383.

The foregoing figures have been quoted to indicate the rapid development of an eradication scheme in actual operation—a scheme that it has been more than once suggested should be adopted, with or without modification, in this country. In this connection it is interesting to learn that the Scottish Branch of the National Veterinary Medical Association have drafted the outlines of a scheme that is not, in essence, widely different from the United States Federal Government plan. It is of further interest to know that one body of agriculturists in Scotland welcomes the scheme, while another does not seem to regard it as practicable. In the interests of the stock-owner himself, as well as in the interests of public health, it is earnestly to be hoped that the efforts of the veterinary profession in Scotland may lead to some definite result of an active nature. It will be lamentable if a policy of *laissez faire* be permitted to continue.

In passing, warm tribute should be paid to those private individuals in this country who, at considerable trouble and expense, have built up tubercle-free herds.

In the current endeavour to control the infection of man by tubercle bacilli from bovine sources, there are factors, such as legislative measures and the systematic inspection of meat and milk, the value of which is estimated differently by different individuals.

In the fight against tuberculosis—both human and bovine—hope from time to time has been raised that immunisation may ultimately prove to be a practicable weapon. Theoretically, there are three possible methods by which immunisation may be produced:—(1) By inoculation with living virulent tubercle bacilli. It requires little thought to arrive at the conclusion that this method is fraught with danger. (2) By inoculation with dead bacilli. This is safe but uncertain; a partial immunity, apparently of varying intensity, is all that is produced. (3) By inoculation with avirulent living bacilli. Concerning this method, much has appeared of recent years in scientific periodicals, and not a little has found its way into the lay Press.

In 1908, Calmette and Guerin isolated a tubercle bacillus—now known for convenience as BCG—and subcultured it in a bile-glycerine medium, thus reducing its virulence to vanishing point. Calmette and his co-workers claim that not only is inoculation of the bacillus perfectly safe, but it induces a satisfactory immunity against subsequent infection by tubercle bacilli. Between 1921 and 1926 they claimed to have vaccinated over 3,000 calves without untoward effects. The calves, moreover, were reported to have remained healthy in spite of the fact that they were born of tuberculous mothers, and all were exposed to possible infection. Children also have been vaccinated with BCG, and good results are claimed.

In June, 1924, Calmette and Guerin made an offer to furnish BCG for experimental trial by workers in general. The offer has been accepted by competent investigators in various parts of the world, but, unfortunately, up to the present, observations have led to varying conclusions respecting the efficiency of the vaccine. In Canada and the United States, in particular, results have not been encouraging. As it happens, during the last few months the Californian Agricultural Experiment Station have published a report of experiments that are of interest in this connection. Haring and his colleagues have arrived at the conclusion that " the resistance to tuberculosis conferred by subcutaneous, intravenous, intradermal, or oral methods of administration of BCG . . . . is not sufficient to justify the use of the vaccine on cattle where measures designed to eradicate tuberculosis in cattle are being successfully

carried out. On the other hand, in countries or localities where control measures are proving ineffective or where eradication seems to be hopeless for many years in the future, the vaccine may eventually be found of economic value to cattle owners by preventing the occurrence of extensive or fatal lesions and by limiting the spread of the disease."

Calmette's claim, recently made, that encouraging results have followed the vaccination of children with BCG, has not been allowed to pass without criticism; and it has been suggested that the reduced mortality among vaccinated infants may be due to the fact that they have been better looked after by anxious parents, watchful nurses and interested observers.

Without being unduly pessimistic, in a case of this kind, where the introduction of a successful and safe method of immunisation would be of incalculable benefit to mankind, it will be well to suspend judgment. Certainly, no kindness can lie in the undue and unjustified raising of hopes that may ultimately prove to be vain.

It is an open secret that an enquiry into the efficacy of vaccination of calves with BCG is being conducted in this country, and the investigators are doubtless alive to the fact that their report is awaited with anxious interest alike by the veterinary profession and the stockowner.

It is very evident that in the campaign against tuberculosis the enemy must either be defeated in open warfare (eradication) or such a defence (immunisation) must be set up as will make his onslaught harmless. And there can be little doubt that it will be well to combine the two.

Though, compared with tuberculosis, less spectacular, dramatic and tragic in its manifestations in the human subject, what has come to be known as *Brucella* infection demands the attention of anyone who would, however cursorily, glance at the diseases of domestic animals in their relation to man. To the study of human infection by organisms to which the name *Brucella*—in honour of Sir David Bruce—has been given, both clinician and bacteriologist have recently devoted much time and labour; and for many years infections of domestic animals—especially bovine—have formed one of the most serious problems with which the veterinary surgeon is confronted.

In 1886, Bruce discovered the organism that is responsible for the condition in man now very commonly known as undulant fever from the characteristic rise and fall of the temperature of the patient. The disease was originally called Malta fever because of its prevalence on that island; and Bruce accordingly named the organism he had isolated *Micrococcus melitensis*. In explanatory parenthesis it should be said that Bruce was deceived by appearances when he thought the causal agent was a micrococcus. It has since been re-christened *Brucella*, in honour of its discoverer.

In 1896, Bang discovered that epizootic abortion of cattle is due to a bacillus—the *Bacillus abortus*, as he called it. Bang's organism, it is now known, has as hosts the domestic ruminants and the pig, and is of enormous economic importance because of the exceedingly widespread infection of cattle. How widespread the infection is in this country it is impossible to say, since there is, as yet, no legislation that renders its occurrence compulsorily notifiable, and no owner of infected cattle is anxious to broadcast the news of his affliction. But in 1927 it was estimated (by Edwards and Coffee) that in the United States it was causing an annual loss of 80,000,000 dollars. And, just as the United States have been more active in legislation against bovine tuberculosis than has our own country, so in connection with bovine *Brucella* infection legislative measures are being taken, and it is predicted that in from two to five years every State in the Union will have laws and regulations governing the movement of cattle that have reacted to tests. Though we may be unable to state in pounds, shillings, and pence what the annual cost of the disease may be in this country, there need be no hesitation in saying that it ranks with tuberculosis in being one of the two most expensive diseases of domestic animals.

From the bacteriologist's point of view, undulant fever of man and abortus disease of cattle, sheep and pigs are of absorbing interest, for modern methods—and more particularly serological methods—have led to the conclusion that the causal organisms are closely related, and indeed are probably the same organism modified by passage through different hosts. Consequently, the bacteriologist now calls both organisms *Brucella*, with the (temporary?) distinguishing adjectives *melitensis* and *abortus*.

That Mediterranean (Malta) fever was to be associated with goats was proved in a series of reports (1905-07) issued by a British Commission appointed for the investigation of the disease. It was found that 50 per cent. of the goats in the island of Malta were infected and that 10 per cent. of them were excreting the organism in the milk.

If the history of undulant fever may be baldly stated to have begun with the goats of Malta, or rather—since the Maltese justly resent any suggestion that their island was the original and sole starting point—of Mediterranean countries, those chapters that have been written within the last few years relate to the greater part of the civilised world. We are told that the infection is now known in every continent except Australia, and that in the United States, Denmark and Sweden it appears to be commoner than enteric. As an example of its wider recognition—which is not necessarily to say its more frequent occurrence—we are informed that during the years 1924-25 only ten cases were recorded as having occurred in the United States; whereas during 1928 and the early part of 1929 over a thousand cases were reported

Fortunately, up to the present, Britain seems to have enjoyed comparative freedom from the disease; but it is possible that the freedom is more apparent than real. Up to a few weeks ago the total number of cases on record were 17, 16 occurring in England and Wales and one in Scotland. But in one recent issue (that for May 10th) of the *British Medical Journal*, no fewer than five cases of a distinctly suspicious character are reported. Close statistics, however, need not concern us at the present moment. What is of immediate importance is the fact that domestic animals are incriminated as being responsible for harbouring the infection. In Malta, countries on the Mediterranean littoral, southern part of the United States, and a few places elsewhere, the goat is held to be responsible. It is possible that in France the sheep may be the guilty animal; and there is much evidence against the pig of the United States. The dog may carry the infection, but no one seems to have made out a strong case against the closest companion of man.

There seems little doubt in the minds of observers that the spread of undulant fever of man (*e.g.*, in Khodesia) is concomitant with the invasion of new areas by *Brucella* infection of animals; and in those countries in which the goat, sheep and pig are not responsible, suspicion is strong that the cow is the great offender. In this connection it is perhaps well to remember that diagnosis of the disease in the human subject has been most frequently based on the agglutination test, and not on the recovery and artificial cultivation of *Brucella abortus*. So far as can be ascertained, in only two cases occurring in this country has the organism been isolated. This is not to be regarded as in any way an attempt to defend the cow from the charge of spreading the disease. Indeed, inasmuch as herein lies another weighty reason—in addition to the economic—why every effort should be made to lessen, if it is not possible to eradicate, contagious abortion in bovines, the charge should be pressed.

The important question has arisen: How is infection carried from animals to man? In the case of the goat and the cow, milk is inevitably suspected as being the medium. But in this there is some division of opinion. For example, Kling, of Sweden, is persuaded that milk is the most probable source of infection, while Kirstensen, who has given close attention to the disease as it occurs in Denmark, has concluded that probably in about 60 per cent. of cases transmission has been by some other agent than milk. As already stated, in the United States the pig is looked upon with increasing suspicion, and the porcine strain of *Brucella* is apparently very pathogenic for man. Naturally, direct transmission of the porcine strain to man cannot be through milk, and consequently other routes have been suspected. It has been suggested that infection may be by the skin, as, for example, in the case of persons whose occupation necessitates the frequent handling of pig carcasses; and the inhalation of dust from pig-pens has been regarded as a possible means by which human infection may be caused. However well or ill-founded these hypotheses may be, it is always possible that man may receive the porcine *Brucella* indirectly, namely, through the cow.

An interesting feature of *Brucella* infection is the relative immunity of the very young. Observations by Schroeder and Huddleson point to the possession by calves of a considerable degree of resistance during the first few months (3 to 5) of their lives; and human infection seldom occurs in children under five years. Whether here are instances of an inherent and natural resistance, or whether, as some have suggested, the sucking young may achieve a degree of artificial immunity by the ingestion (by milk) of repeated small doses of *Brucella*, is, as yet, an open question; but one that possesses a distinct measure of interest. In the consideration of relative susceptibility, some importance may attach to the alleged fact that young adult males are more frequently sufferers than other classes of the population.

But, as already suggested, apart from their great importance as being transmissible to man, *Brucella* infections of domestic animals, and especially of bovines, insist on the attention of the economist. Recently we have been told in effect more than once, and it has been definitely stated in print, that "the world is faced with a shortage of cattle and the time is drawing near when this will bring serious consequences, to this country in particular" (Sir Wm. Haldane, *Jour. R.A.S.E.*, Vol. 90, 1929). Statistics have been compiled which show that the cattle population of the world is not keeping pace with the growth of the human population, and official returns of our own country indicate that this is not temporary but, since the number of calves has actually decreased, must continue for some years at least. It is doubtless true that some of the decrease is due to reluctance on the part of the farmer to expand an unprofitable department of his industry. But it is also highly probable—nay, certain—that bovine *abortus* disease is an important factor; and it is not surprising that voices, in increasing numbers, are being raised asking that measures of an effective kind be taken to lessen a heavy affliction under which the cattle breeder labours.

Of all the diseases of domestic animals that affect the well-being of man, it is safe to say that no two fill the human angle so completely as do tuberculosis and *Brucella* infection. In both conditions the economist is deeply concerned; both offer problems to the pathologist; and both come within the province of those whose duty it is to protect, to the greatest extent that is humanly possible, the health of the community.

Legacies to the Zoological Society.

A Bequest Upheld.

Mr. Justice Farwell has decided that a bequest to the Zoological Society of London, estimated at £79,000, is a good charitable gift. The testator, Mr. George de Arroyave Lopes, made the bequest on certain not very onerous conditions.

"The will raised some technical questions, of which the chief was the legal status of the Society," says *The Times* zoological correspondent. "The Judge decided that it was a charity, its objects, as stated in its Royal Charter, being largely educational and charitable, none the less because it was necessary to provide restaurants to feed the people who came to be educated or animals to be ridden by children for their amusement in the intervals of their education. The Society supported a laboratory and did research in zoology.

"The Zoological Society has received very few bequests. In 1870 a deceased Fellow, Alfred Davis, left it the sum of £2,000 to form a perpetual fund, the income to be applied to the creation of annual prizes or any other purpose which might seem to the council conducive to the interests of the Society. Under the will of Herbert Spencer, his property was to be vested in trustees, directed to carry on his work in descriptive sociology until its completion, or until 21 years after the death of the last survivor of all the descendants of Queen Victoria alive at the date of his death, when the property was to be realized and divided in equal proportions among 12 societies, of which the Zoological is one. Other bequests have been of books and drawings or of small sums ranging from £50 to £300.

"In all these cases the gifts to the Society were absolute and raised no legal difficulty. The Lopes bequest, however, has to pass over to another beneficiary if the conditions be wilfully neglected, and therefore the capital has to be preserved intact in independent hands."

Diploma in Tropical Veterinary Medicine.

(D.T.V.M., Univ. Edin.)

This Diploma has been instituted in 1930.

Candidates must comply with the following Regulations. (Further information may be obtained at the Office of the Dean of the Faculty of Medicine, University of Edinburgh.)

Regulations for the Diploma.

1. Before admission to the course, candidates for the Diploma must hold an approved veterinary qualification registrable by the Royal College of Veterinary Surgeons.

2. The curriculum for the Diploma consists of two parts —Part I (October to December), and Part II (January to March).

Part I.—Autumn Term.	Hours.
Entomology and Parasitology	120
Bacteriology	75
Lectures and Demonstrations on Special Subjects	20

Part II.—Spring Term.	Hours.
Parisitology and Entomology	80
Personal Hygiene in the Tropics	10
Food Production (Meat and Milk); its Control ...	20
Feeding of Animals in the Tropics	50
Breeding of Animals	20
Epizootology	40
Lectures and Demonstrations on Special Subjects	20

Note.—Opportunity will also be given to members of the class for special laboratory work in Bacteriology as may be arranged.

3. Instruction in the above subjects will be provided by the University and the Royal (Dick) Veterinary College.

4. Candidates must produce certificates to the effect that they have regularly attended each course of instruction and have satisfactorily performed the work thereof.

5. It shall be competent for the Faculty of Medicine to exempt from attendance on a course or courses, candidates who present evidence of special study and experience in the subject concerned.

6. Examinations, written, oral, and practical, qualifying for the Diploma, will be held at the end of the first and second parts.

7. Candidates on the first occasion of presenting themselves for examination in each part must appear in all the subjects thereof.

8. If any candidate fail to pass in any part or parts of the examination, it shall be competent for the Faculty of Medicine to require the candidate again to attend any course or courses of instruction before being readmitted to examination.

9. Candidates will be required to matriculate for the academic year in which they attend courses of instruction or present themselves for examination.

. . . . .

Fees.

	£	s.	d.
Inclusive Fee for Part I or Part II	15	15	0
Matriculation Fee for each academic year ...	2	12	6
Examination Fee for Part I or Part II ...	3	3	0
Re-examination Fee for Part I or Part II ...	2	2	0

. . . . .

Courses of Instruction.

Entomology and Parasitology.

(Professor J. H. Ashworth, Dr. A. E. Cameron and Dr. T. W. M. Cameron.)

This class will be devoted to a study of the structure, life-history, and bionomics of animal parasites and animal carriers of disease, as well as to the important host reactions. The course during the winter term deals with the subject as required for human tropical medicine; the spring term supplements this with a study of the protozoa, helminths and arthropods of importance to stock, which have not been dealt with in the first term. The two terms together form a complete course in veterinary parasitology and entomology. About two-thirds of the time is devoted to practical work.

Feeding of Animals in the Tropics.

(Professor Linton.)

This class is devoted to a general consideration of the important principles underlying the nutrition of farm animals together with a consideration of the application of these to tropical conditions and food stuffs.

Food Production (Meat and Milk): Its Control.

(Professor Linton.)

This class considers the methods employed in the production of milk, milk hygiene and the treatment of dairy animals, the hygiene of slaughter houses, methods of slaughter, hygiene of meat, etc. About half of the time is devoted to practical work and demonstrations.

Animal Breeding.

(Mr. W. C. Miller.)

This class discusses the more important principles underlying animal breeding and applies these to the peculiar problems existing in tropical lands, *e.g.*, improvement of native herds, breeding of dairy and fat stock, hybrids, conformation in stock, methods of conducting experimental breeding stations, etc.

Practical Bacteriology.

(Professor Mackie.)

This class considers methods of applying bacteriology in the field, together with instruction in the resources of bacteriology in the laboratory. It is intended to instruct the student in field methods and give him some knowledge of how his material is dealt with in the laboratory. A previous knowledge of systematic bacteriology is assumed.

Personal Hygiene in the Tropics.

This is a short course of lectures intended to assist the tropical officer in keeping healthy when abroad. It is intended primarily for those who are proceeding overseas on their first appointment.

Epizootology.

This class, by various authorities, will consider control of epizootics in the field, diseases of animals communicable to man, principles of statistics as applied to the veterinary services, field organisation, dips and disinfectants, economic disposal of waste products, etc.

Special Demonstrations and Lectures.

Visits to slaughter-houses, disposal plants, tanneries, as well as special lectures of importance to the tropical officer will be arranged from time to time.

. . . . .

In Parliament.

Royal Veterinary College.

LORD HAREWOOD'S APPEAL IN THE HOUSE OF LORDS.

In the House of Lords on Thursday of last week (as recorded in our issue of July 26th) the Earl of HAREWOOD asked the Government if they had investigated the position of the Royal Veterinary College, and what steps they were prepared to take to maintain it; and moved for papers. He said that the college had reached a stage in its career when some action must be taken within the next few weeks if the governors were to be prevented from taking the preliminary steps which would eventually lead to the closing of the college—namely, the refusal to accept new students. At present the expenditure of the college exceeded the income, and the buildings were in an irreparable state of disrepair. The annual deficit, however, was diminishing owing to the increase of students' fees and subscriptions from private sources throughout the country. During the last three years the governors had raised £30,000 towards the building fund. The Departmental Committee which reported last year recommended that the freehold of the site at Camden Town should be purchased for £20,000; secondly, that a sum of £280,000 should be spent on erecting new buildings; and thirdly, that a sum of £25,000 should be spent outside London for the purposes of providing a research laboratory affiliated with the college. The Committee also recommended that the annual income of the college should be guaranteed at not less than £21,000. He had received a letter on the previous evening from Lord De La Warr stating that the conclusions of the Government—which he hoped were not fixed—were that the sum of £20,000 for the purchase of the freehold should be cancelled, while expensive buildings should be erected on the leasehold site at a cost of £250,000, instead of £280,000, which the Departmental Committee considered was the absolute minimum. He (Lord Harewood) was very doubtful whether £250,000 would be sufficient for the purpose, but the governors would be willing to consider the Government's offer on that point if they saw any reasonable prospect of securing £250,000 with which to build.

The Government's offer was to give pound for pound for the £30,000 which the governors had in hand and provide £70,000 in addition. That made £130,000, and the Government added that when the sum collected by the governors reached £200,000 they would be prepared to recommend to Parliament a further grant of £50,000. From what he knew of the condition of agriculture at the present time, he scarcely thought there was the slightest hope of getting that £70,000, and so sure did the Chairman of the Governors and the treasurer of the college feel on the point that they informed him that morning that at a meeting of the Governors next week they would recommend that the Governors should refuse the whole of the offer of the Government, because there was no hope of raising a sufficient sum to rebuild the college. They would have to refuse to admit further students into the college, but the actual closing of the college would take about four years, because the Governors were so far committed to the students already there not to close before their course of instruction had been definitely completed.

Lord ERNLE said it was a disgrace to this country that the college should be allowed to lapse into extinction. In Berlin the annual sum paid for veterinary science was £280,000, while here it was only £16,000. The college had a chance of becoming affiliated as one of the schools of the University of London, but the University could not be expected to accept a college whose buildings were hopelessly inadequate, and whose finances were practically insolvent.

Earl DE LA WARR, Parliamentary Secretary to the Ministry of Agriculture, said that the offer which the Government made in August to the governors of the college was that they would give £1 up to £100,000. The governors felt that, whether that was a reasonable offer or not, they would not be able to collect sufficient money to make up the amount of £280,000. He took it that what the noble lord would like would be that his Majesty's Government should take over the college completely, rebuild it at the expense of the State, and provide virtually all the maintenance expenses. That would be an entirely new principle in the relations of the State with what amounted to a university department. Hitherto the policy had been that education of university rank should be aided by Government grant, but that the Government did not take the responsibility of maintenance, which was primarily a matter for the governing body. The Government could not accept the view that the entire responsibility for veterinary education should ultimately fall upon the State; but, in view of the special circumstances associated with the college, the Government had gone up to an offer of 30s. per £1 raised. He suggested that the governors should make an effort to raise the money required, and, if they did so, they would have all the assistance and encouragement that the Ministry of Agriculture and his Majesty's Government could give them.

Lord PHILLIMORE, Earl BATHURST, Viscount BRENTFORD, and Lord DANESFORT appealed to the Government to save the College.

Earl DE LA WARR said that he could not hold out any hope that the Government would reconsider their decision, but he suggested that Lord Harewood and his friends might have a conference with the Ministry of Agriculture before coming to a decision as to the future of the College.

The Earl of HAREWOOD said he would see the chairman of the governors and the treasurer and try to persuade them to take in, at any rate, one further lot of young students if he could not hold out any hope that the Government would see them through the absolute expenses necessary for carrying on the course for the next year or two. He withdrew his motion for papers.

. . . . . .

Draft Time Table of Course.

AUTUMN TERM. (October to December.)

Entomology and Parasitology: Monday, Tuesday, Thursday and Friday, 9-12.

Bacteriology: Three afternoons weekly (probably Wednesday, Thursday and Friday) for 2½ hours each.

Lectures on special subjects at hours to be arranged.

SPRING TERM. (January to March.)

Parasitology and Entomology: Tuesday and Thursday, 9-1.

Food Production (Meat and Milk): Monday and Friday, 11-1.

Feeding of Animals in the Tropics: Tuesday and Friday, 2-4.

Breeding of Animals: Tuesday, 4-5; and Thursday, 3-4.

Personal Hygiene and Epizootology at hours to be arranged.

Ample time is allowed in both terms for private reading, revision and special study.

"No Veterinary College?"

The Times, on the day following the debate, published, under the above heading, the following leading article:—

"Tht debate about the Royal Veterinary College, raised yesterday in the House of Lords by Lord Harewood, draws renewed attention to an intolerable state of affairs. It is a common boast of the people of Great Britain that they are second to none as lovers of animals. It is also universally recognised that because of the excellence of the live-stock bred and reared in this island it is looked to by the nations overseas as the central source for the creation and replenishment of their flocks and herds. For these reasons it is especially incumbent on Great Britain to provide the best possible facilities in the way of environment and equipment for the teaching and study of veterinary science. Unfortunately, as has long been well known,

this has never been achieved. Almost every other country of any importance is in those respects far ahead of us. The highly qualified professors of the Royal Veterinary College and the students whom they train are perpetually hampered by the unsuitable conditions in which they have to work. By well-qualified observers the condition of the College has been described as a scandal and a national disgrace. The members of its teaching staff are too few in number, and its buildings, some of which have been condemned by the London County Council, are dark, gloomy, hopelessly out of date, and entirely inadequate.

"The Departmental Committee appointed in 1928 to report on the reconstruction of the College found that it needed rebuilding and re-equipping so as to meet the requirements for the education of the veterinary practitioner and the need for officers to satisfy the growing demands of the State and of public authorities. The all-in capital cost of the scheme, including the purchase of the freehold of the property, they put at £300,000. Towards this sum the governors have collected £30,000, and the Government, according to the statement made by Lord Harewood, have offered to give pound for pound up to this amount and to provide £70,000 in addition. They are also prepared to recommend Parliament, when the sum collected by the governors has reached £200,000, to allow a further grant of £50,000. The governors, however, have no hope of raising the required £70,000, and are now contemplating a step which would eventually lead to the closing down of the College. In order, if possible, to prevent this catastrophe, Lord Harewood has undertaken to try to persuade the College authorities that they should admit at any rate, one further set of students, if he could hold out any hope that the Government would see them through the expenses absolutely necessary for carrying on the course for the next year or two. This guarantee, unless some other means of meeting the crisis is evolved, must, of course, be forthcoming. Parliament or the public, or both together, must provide whatever sum is needed, not only to keep the College on its feet, but to enable it to carry out its responsible task with proper efficiency. The idea that the country should be left without its Veterinary College cannot be entertained for a moment."

. . . . .

The Need for a Bigger Grant.

In a letter published in *The Times* of Tuesday last, Major-General Sir John Moore, K.C.M.G., C.B., F.R.C.V.S., says :—

"Those who are interested in the survival of the Royal Veterinary College, London, will have read with approval your leading article of July 24th, following on the question asked by the Earl of Harewood the previous day in the House of Lords.

"In his reply, the Parliamentary Secretary to the Ministry of Agriculture would appear to have misunderstood the purpose of the Earl of Harewood and the Board of Governors associated with him. There is no intention on their part that 'His Majesty's Government should take over the college completely,' nor is there any thought in their minds 'that the entire responsibility for veterinary education should ultimately fall on the State,' both of which statements imply a State ownership and control.

"Whatever system is pursued in other countries where veterinary schools belong to the State and are immediately under State control, it is generally acknowledged that the proper course in this country is one of affiliation to universities, carrying thereby all the advantages of university education and standing. On affiliation, however, of the Royal Veterinary College to, say, the University of London, it is only right that Government responsibility should be so ordered that the college becomes a school of the University adequately provided for in buildings and equipment requisite for special scientific training, and not as it exists to-day, either financially or structurally.

"With regard to the provision of funds necessary to rebuild and equip the Royal Veterinary College, the Departmental Committee, appointed last year, after careful inquiry and the taking of expert opinion, definitely stated that the capital sum of £325,000 would be required. Towards this the Ministry of Agriculture, through the Development Commissioners, who operate entirely on behalf of Agriculture, have advised, and the Treasury have approved, that the allocation of £100,000 is made on the understanding that an equivalent £100,000 was subscribed from other sources, that is to say, by the Governors through appeal to friends and sympathisers. Appeal has resulted in £30,000 up to date, and to reach the high-water mark of another £70,000 is asking the impossible. Perhaps the Parliamentary Secretary to the Ministry of Agriculture does not realise that the industry for which he is at present responsible is in such a depressed condition that often farmers cannot afford even to pay the accounts of veterinary surgeons.

"However, veterinary colleges do not exist entirely for the benefit of home agriculture. Veterinary science is directed towards other State and public interests. For instance, it exercises a great influence on public health in the prevention of disease, both human and animal; it enters very largely into the development and success of our Dominions and Colonies, so much so that under the recent Lovat Commission there are important proposals for the grading up of the Colonial Veterinary Services. Then again, if affiliated to universities, veterinary education is involved in the general measures of university training.

"Duly considering, therefore, the above and in the light of the £325,000 capital sum required to rebuild and equip the Royal Veterinary College, I venture to propose the following provision of funds, and allocation to the Budget headings of the various Departments of State concerned :—

(*a*) £100,000 from the Ministry of Agriculture through the Development Commission, to stand as proposed.

(*b*) £50,000 from the Ministry of Health and chargeable to county and borough councils.

(*c*) £50,000 from the Ministry for the Dominions and Colonies.

(*d*) £25,000 from the Ministry of Education through the University Grants Committee.

(*e*) £100,000 (£30,000 of which has already been obtained) to remain as an item for private and voluntary contribution.

"Of course, it may be argued that it does not matter how Government money is allocated as it all comes out of the same bag, the Treasury, but provision is made easier if spread over various Budget headings, and it is quite right that Ministries concerned should bear their just quota."

The Shovel-Toothed Mastodon.

Writing to his paper on July 25th, the Peking correspondent of *The Times* says :—

"The discovery of remarkable fossil deposits on the shores of an enormous lake, now dried up, near the borders of Outer Mongolia, is reported by Mr. Roy Chapman Andrews, who returned to Peking last night.

"Buried in a mass of soft mud, in which the beasts were evidently entrapped while searching for food, the Expedition found the remains of some 25 to 30 shovel-toothed mastodons (*platybelodon*), with huge projecting jaws averaging about 5½-ft. long. Another bog-hole contained skeletons of from 10 to 15 baby mastodons, presumably deserted by their parents when unable to extricate themselves from the quicksands.

"The chief scientific importance of the discovery lies in the fact that it is now possible to make a perfect reconstruction of a creature of which previously only a single jaw had been found."

Report of the Committee on Abortion, United States Live Stock Sanitary Association, 1929.

Control of bovine infectious abortion, has proceeded satisfactorily during the past year. It is very encouraging to compare the report of your committee on abortion of four years' ago, with the situation that exists in the United States to-day in respect to this disease. In 1925 your committee reported that two states had adopted regulatory measures to prevent the introduction of the disease by cattle purchased and coming into the commonwealth from other states. These regulations required a health certificate stating that the blood of the animal had been tested serologically and that no evidence of infection by the Bang organism could be found. One state was doing accredited herd work with the disease and several commonwealths had educational work in progress. This represented the efforts officially to control the disease.

Now, 1930, nine states and the province of Hawaii require a health certificate based upon the blood test. Seven additional states will not permit the entrance of animals which are known to give a positive reaction to the serological test for Bang's disease. Nineteen states have definite regulations governing the control of infectious abortion. Twenty-one states still have no regulations regarding the disease, but it is interesting to note that sixteen out of these twenty-four have regulations which they are about to adopt, or are pursuing educational campaigns working towards the control of this infection. Six states prohibit the sale of known infected animals within their confines except under permit from the live stock sanitary authorities. Eleven states are doing work on the accreditation of herds free of Bang's disease.

The progress that has been made during the past year indicates that nearly all of our commonwealths are fully aware of the dangers of this infection and are formulating rules and regulations looking towards its control. As was pointed out by your committee several years ago, each state has its own individual problem and as your committee advised, each sanitary official should study his own problem and put into effect rules and regulations which are advisable under the circumstances that exist in his state. The above report indicates that sanitary officials have, in general, done this.

There are five things that your committee this year desires to call particularly to your attention. *First*: It has been definitely demonstrated that up to the present time, the only method which has been clearly shown as satisfactory for the control of this infection is the clean herd on the basis of the serological tests. This brings these tests definitely into the limelight, and several things in regard to them should be considered.

The committee on abortion of the American Veterinary Medical Association recommended—in its report, which was accepted by the association—that a committee be appointed, looking toward the standardization of these tests. The American Veterinary Medical Association committee stated that in their judgment this should be a combined action, or should be referred to three organisations, namely, this association, the conference of national and state experiment station workers in animal diseases, and the committee on abortion of the National Research Council. It seems to your committee that this recommendation is a good one. The serological tests do need standardization. If such tests are to be used for the interstate traffic of cattle, it is absolutely necessary that they be made as uniform as possible. This was demonstrated when the intradermal tuberculin test was adopted generally by the states and was used as a test for the interstate movement of live stock. Your committee therefore recommends that this association either appoint a special committee on the standardization of the tests or refer it to the committee on abortion to be appointed by the incoming president, with power to act, and also to instruct this committee to co-operate with the two organizations mentioned above.

Second.—During the past year, several additional states have made the requirement of a Bang's disease health certificate for entrance of cattle into their commonwealth. We believe it would be a wise thing for the sanitary authorities of the different states that are contemplating action of this kind, or in fact, that are contemplating any regulations in regard to the control of this disease, to communicate with the sanitary authorities of other states so that such laws or regulations may be made as uniform as possible. We believe that the time has come when as uniform rules and regulations as possible should be adopted generally in the United States in respect to the interstate movement of cattle so far as this disease is concerned. We believe the states in different groups can get together advantageously, talk over their problem, and initiate either rules, regulations, or laws governing the control of this infection. Such group meetings have already started. The veterinary sanitary officials of California, Idaho, Nevada, Oregon and Washington met in Oakland in November, 1928. Pennsylvania, Maryland and New Jersey met very recently, and are projecting work, looking towards uniformity. We believe that this is an important point and should be carefully considered by the sanitary officials of all states.

Third.—Last year your committee presented a very detailed report in regard to the preparation of live vaccines. Data presented in this report indicate clearly the great variation in manufacture of these products. This year, at the meeting of the American Veterinary Medical Association at Detroit, Doctor Hallman and his co-workers presented a report in respect to the so-called " avirulent cultures " that were used commercially, for immunisation against Bang's disease. This report was based on a study of nine commercial vaccines. Their data indicate that all of those studied were either dead or virulent. Your committee desires to state that the use of living vaccines, which are virulent or which may become virulent, is a dangerous procedure. We recommend that their distribution be prohibited. This is stated, not only because of the relation of the use of these products to the control of the infection in cattle and other species of live stock, but because of the added danger of the transmission of the infection to human beings. We do not imply by this that vaccination as a method of control of Bang's disease is not worthy of study. We do state most emphatically, however, that it is still in the experimental stage and should be kept under close supervision of competent research specialists.

Fourth.—Your committee is fully cognisant of the notoriety which undulant fever has gained during the past year. Presentation of this subject, at this meeting, has been delegated to the public health service of the United States. You have already listened to this presentation. Your committee again wishes to call your attention to the fact that there is no doubt that cases of undulant fever occur in man which are undoubtedly contracted in laboratories, through milk and its products, and through contact with affected cattle and swine. Your committee further wish to state, however, that in their judgment, it has not been definitely proved that any *one* source is the most important method of transmission of this disease to man. Further, they wish to state that investigations of cases of undulant fever in man, not only from the epidemiological standpoint, but also from the *bacteriological* and *pathological* standpoint, are absolutely necessary, and we earnestly recommend that the agencies doing investigational work in this field, pay particular attention to these phases of the study of undulant fever.

Fifth.—As a final recommendation, your committee desire to call the attention of those commonwealths which are still allowing Bang's disease to proceed unattacked, within their confines, to the fact that it is is exceedingly urgent that they adopt rules and regulations, or educational procedures, looking toward effective control. The basic facts which underlie the successful control of this disease, have been pointed out to this association for several years. They remain as facts to-day. They have stood the test of time. They await your use as a basis for the adoption of control measures. The merits of the agglutination test, its possibilities and limitations, the value of segregation of the non-reactors, and the procedure of raising herds free from the disease, should be constantly kept before those whose duty it is to protect animal health. The live stock industry of this country will shortly demand that you adopt the proper rules and regulations for the control of this disease within your state. Further delay will only serve to bring additional burdens upon the cattle industry of your community.—*North American Veterinarian.*

Notes and News.

The Editor will be glad to receive items of professional interest for inclusion in these columns.

Diary of Events.

Aug. 2nd.—**Meeting of Council, N.V.M.A., Central Hall, Westminster, 10.30 a.m. Professor James Macqueen Luncheon and Presentation, St. Ermin's Hotel, Westminster, 1 p.m. N.V.M.A. Conference on Grading of Milk, Central Hall, Westminster, 2.30 p.m. N.V.M.A. President's Reception and Dance, Holborn Restaurant, 7.30 for 8 p.m.**

Aug. 9th.—**N.V.M.A. Annual General Meeting, Central Hall, Westminster, 9.45 a.m., to be followed by an Extraordinary General Meeting.**

. . . . .

AUGUST 4th to 9th.—11th INTERNATIONAL VETERINARY CONGRESS, CENTRAL HALL, WESTMINSTER.

. . . . .

Aug. 11th.—Meeting of the Editorial Committee, N.V.M.A., 4.30 p.m.; 2 Verulam Buildings, Gray's Inn.

Army Veterinary Service.

LONDON GAZETTE—WAR OFFICE—TERRITORIAL ARMY.

July 25th.—Major F. E. Heath, having attained the age limit, relinquishes his commission and retains his rank (July 26th).

. . . . .

July 29th.—Maj. D. R. Chalmers having attained the age limit, retires and retains his rank, with permission to wear the prescribed uniform (Feb. 27th, 1929) (substituted for the announcement regarding this officer which appeared in the *Gazette* of Feb. 26th, 1929); Lt. L. L. Jones to be Capt. (Jan. 21st).

. . . . .

INDIA OFFICE.

July 25th.—The following officer has vacated his appointment in India:—

COMDT.—ARMY VET. SCH.—Major (Bt. Lt.-Col.) T. E. Burridge, R.A.V.C. (Dec. 18th, 1929).

Agricultural Research.

A COMMITTEE OF THE PRIVY COUNCIL.

An Order in Council published in the *London Gazette* and dated July 28th, directs that the Lord President of the Council (Lord Parmoor), the Minister of Agriculture and Fisheries (Dr. Addison), the Home Secretary (Mr. Clynes), the Secretary of State for Scotland (Mr. W. Adamson), and the President of the Board of Education (Sir Charles Trevelyan) shall be a Committee of the Privy Council for the organisation and development of agricultural research. It is also ordered that during his Majesty's pleasure the Lord President of the Council shall be the chairman, and the Minister of Agriculture vice-chairman, of the Committee.

Animal Diseases Research Association.

Dr. Henry Dryerre, M.R.C.S., L.R.C.P., PH.D., F.R.S.E., who has, during the last ten years, held the joint appointments of Professor of Physiology in the Royal (Dick) Veterinary College, and Lecturer in Physiology at Edinburgh University, has been appointed Physiological Biochemist to the Animal Diseases Research Institute, Moredun, Edinburgh.

While Dr. Dryerre will relinquish his University post, he will continue his professional appointment at the Royal (Dick) Veterinary College.

Dr. Dryerre has been intimately associated with Dr. Russell Greig, the Director of the Moredun Institute, in the elucidation of the problem of milk fever, and he brings to the Moredun Institute not only a large experience in Veterinary Physiology, but a wide knowledge of technique.

Mr. W. S. Gordon, M.R.C.V.S., has received the appointment of Senior Bacteriologist.

Mr. Gordon, for the last four years, has been a Research Assistant at the Wellcome Research Laboratories, and is well-known among south country flock-masters in connection with investigations into lamb dysentery and braxy.

These appointments will mark a distinct accession to the strength of the research staff of the Moredun Institute.

Three Years for Sheep Stealer.

John Hoyle, a Heckmondwike butcher, who pleaded guilty at North Riding Quarter Sessions at Northallerton on July 3rd, to what was described as the worst case of sheep stealing in modern times, was sentenced to three years' penal servitude. His 16-year-old son, Clifford, was bound over. It was stated that father and son travelled all over Yorkshire stealing sheep, which they killed and sold in Heckmondwike market.

An M.O.H. on Milk.

Said the M.O.H. of Ramsbottom recently:—"Milk is a perfect food, and the cheapest. Even if it were double its present price it would be the cheapest food in the market. If the country had a proper sense of values it would double the quantity of milk used; that would increase the number of cows kept, help agriculture, and would free us of a great amount of money that goes abroad for meat." "Would that all men bearing the letters M.O.H. would talk in like fashion!" comments the *Scottish Farmer*.

Table Poultry Breeding.

The report by the Southern Sub-Committee for the National Poultry Institute Scheme, dealing with experiments in table poultry breeding at the South-Eastern Agricultural College, Wye, Kent, has been issued by the Ministry of Agriculture as Bulletin 18, and can be obtained from the Ministry, 10, Whitehall Place, S.W.1, for 1s. 6d. net. The report has been expected for some considerable time; but it appears appropriately just when public interest is centred upon poultry-keeping, and it supplies evidence that systematised production of table fowls can be made to pay.

International Horse Show, 1931.

The Twentieth International Horse Show will be held at Olympia from Thursday, June 18th, to Saturday, June 27th, 1931.

Correspondence.

Letters to the Editor should reach the Office not later than by the first post on Tuesday morning for insertion in following Saturday's issue.

All correspondence must bear the name and address of the contributor for publication.

The Editor does not hold himself responsible for the opinions of his correspondents.

A Victory.

To the Editor of the Veterinary Record

Sir,—I have much pleasure in forwarding, for publication in the *Record*, copy of an article taken from the *Argus*, with reference to the result of an appeal made by Major F. Murray Jones, M.R.C.V.S., B.V.SC., Chief Inspector of Stock for Western Australia, against his being retired on "the grounds of financial stringency." The National Veterinary Medical Association sent a cablegram to the Premier for Western Australia, urging that the retirement of Major Murray Jones receive his personal consideration, and it is very gratifying to read the result of the appeal.

This case shows the necessity of an independent Board of Appeal which can give an unbiased opinion after hearing and considering all facts. Too often, from a so-called disciplinary point of view, the Head of a Department is, rightly or wrongly, supported, and justice to the suffering person is not always done.

While in Perth I was courteously received by Major Jones and was much impressed with his energy, ability and desire to make progress under great difficulties. The veterinary profession in every part of the world will congratulate Major Jones and wish him success in the future.

We feel sure he will take his victory *Consilio, animis et prudentia*. The Live Stock Branch of New South Wales, under the able administration of Lieut.-Colonel Max Henry, D.S.O., M.R.C.V.S., is a good example of what can be done when free from any external control and responsible only direct to the Minister. *Floreat*.

Yours faithfully,
T. D. Young.

Veterinary Inspectors' Office,
503-4 Central Markets,
Smithfield.
July 23rd, 1930.

The article to which our correspondent refers is as follows:—

Public Servant Retired.

Appeal Successful.

Commissioner's Action Criticised.

Perth, Monday.—The Public Service Appeal Board, of which Mr. Justice Draper is chairman, has decided that F. Murray Jones, who was recently retired from the position of chief veterinary officer, was treated with grave injustice by the Public Service Commissioner (Mr. G. W. Simpson). The Commissioner has been directed to recommend the Governor to reinstate Jones, and to take all necessary steps to make the recommendation effectual.

Mr. Justice Draper, in his report to the Governor, said that the retirement purported to be the result of the financial stringency, but there was some ground for appellant's contention that it was due to the antipathy of the Director of Agriculture (Mr. G. L. Sutton). The Commissioner's grounds for retirement were the financial stringency, and that Jones was the cause of friction in the department. It was doubtful whether anything was saved by the retirement, and the directors' evidence regarding friction was of a general nature which the board did not accept. It was clear that Sutton and Simpson at once decided to get rid of Jones. If there was friction in the department it might have been caused by the director, who said that he thought that Jones was at the back of a movement to separate his sub-department from the director, which was antagonistic to Jones.—*The Argus*, June 17th, 1930.

Veterinary Education.

To the Editor of The Veterinary Record.

Sir,—Sir John M'Fadyean has added to his reputation for sound judgment and to his services to the profession in stressing the need for the extension and development of practical and clinical instruction for students taking the course of study for the diploma. It may be said that every member of the profession is in entire accord with the desirability of improving matters in this respect in the revised course which is now under consideration. There may be some divergence of opinion in regard to the best method of bringing it about, but there is general agreement that during his academical career a student should be given every facility and encouragement to familiarise himself with farm animals in health and gain practical knowledge by seeing practice during the College vacations. I agree with Professor Hare that the responsibility of providing ways and means must rest with the teaching colleges in collaboration with the Council of the R.C.V.S. As the examining body, the last named is empowered to prescribe a system of examination which, without hardship to students, should aim at demanding evidence of practical experience. Obvious difficulties must arise if the Council merely demanded evidence that a student had spent a certain period in attending the practice of a veterinarian and it is doubtful if the result would be worth while.

In the present system of examination the only practical examination prescribed is in pharmacy, while in the examinations conducted by the Conjoint Board for the L.R.C.P., M.R.C.S., practical examinations, in addition to written and oral, are prescribed in anatomy, physiology, pathology, medicine and surgery. In addition, clinical examinations are prescribed in medicine, surgery and gynæcology.

I maintain that our present system of examination is lacking on the practical side and that, although our students are taught a certain amount of technique, they should not only be taught more, but that they should be examined in it. Human nature being what it is, students are at present constrained to neglect an importance of technical knowledge and, although it must be admitted that much of this has to be gained after qualification, the existing standard required of diplomates is too low.

Yours faithfully,
G. K. Walker.

Abingdon.
July 26th, 1930.

The Editor acknowledges the receipt of the following:—
Communication from Messrs. C. S. M. Hopkirk and D. A. Gill (New Zealand).